JULY 15, 1944

Railway Age

Founded in 1856

THE LIBRARY OF CONGRESS SERIAL RECORD
JUL 24 1944
COPY
GIFT

For AIR PIPING in these new cars these associated refrigerator car lines use BYERS WROUGHT IRON

These new cars are from a group of 400 which have been completed by the refrigerator car lines in their Company shops. Byers Wrought Iron is used for the air piping. The companies have been consistent users of wrought iron for this service in new construction and for maintenance.

Everyone familar with the conditions faced by air piping on refrigerator cars will recognize the wisdom of this choice. As in all car piping, the lines are exposed to continued vibration which causes crystalization and fatigue failure in any vulnerable materials. Wrought iron withstands this punishment, and has for many years been regularly used in applications where vibration was a hazard. In addition, the piping is subjected to corrosion by melting ice or brine drippings.

Wrought iron is known to every railroader as a material that possesses extremely high resistance to fatigue failure. And to every man who has studied corrosion, wrought iron is accepted as a leader, within the class of commonly used ferrous materials, in the high degree of corrosion resistance it possesses.

These two properties that make wrought iron so desirable for refrigerator car piping are attributed to the unusual combination of the high purity base metal and the intermingled slag. This results in a structure that might be compared to that of a stranded wire cable. Vibration and shocks do not cause changes in structure that might predispose the material to early failure. The network of fibers also helps to check and diffuse corrosive attack, as well as anchoring the protective film that shields the underlying metal.

Full dimensional information on Byers Wrought Iron is carried in the General Catalog. If you do not have a copy in file we will be glad to furnish one.

A. M. Byers Company. Established 1864. Offices in Pittsburgh, Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS • OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

Reliance HY-CROME Spring Washers

PARTS Protection THRU Ground Deflection

"Tension There in Spite of Wear"

Ground deflection of **HY-CROME SPRING WASHERS** is optional but required by most users. This specific method of deflecting is an Eaton-Reliance development, and has many advantages:

1. Deflecting prevents the scoring of nut face when tightening nut.
2. Deflecting permits removing the nut without spreading the washer, making its reuse possible.
3. Deflecting protects the bolt threads from the displaced metal flow usually found on the inside diameter of stamped deflected washers, especially where thread clearance is close.
4. In removing nut after tightening same the nut face, joint bar or bolted surface is not damaged by deep scoring if correct deflection is used.
5. The physical properties of spring washers are not impaired by ground deflection.
6. Eaton-Reliance ground deflection is uniform and of proper angle for correct bearing, with no metal flow.

This quality feature of **HY-CROME SPRING WASHERS** is an additional reason why many discriminating motive power engineers prefer ground deflected **HY-CROME SPRING WASHERS** for the protection they provide to nut, bolt and surface parts.

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

The word no railroad man knows

Many times during these war years, when it seemed that the limit of their capacity had been reached, the railroads shouldered new burdens, took on new responsibilities. Many of these were straws that might have broken the camel's back. But none of them did . . . because the roads met the challenge with their usual resourcefulness and stamina. To a railroad man, there's no such word as "can't."

When available, extra equipment was added. Many new cars were rushed into service. Older rolling stock was reconditioned, kept on the job. And much of this rolling stock is today rumbling across the country on Bethlehem wheels and axles—carrying the heaviest passenger and freight loads in transportation history.

This same Bethlehem running gear will be giving good service after many, many thousands of miles. For Bethlehem wrought-steel wheels and forged-steel axles are rugged, durable, shock-resisting—engineered for an extra margin of safety and mileage even under the burdens of wartime traffic.

That extra margin has always characterized Bethlehem wheels and axles in times of peace. It is a quality that is doubly valuable today.

BETHLEHEM WROUGHT-STEEL WHEELS AND FORGED-STEEL AXLES

Published weekly by Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter, January 4, 1933, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price $6.00 for one year U. S. and Canada. Single copies, 25 cents each. Vol. 117, No. 3.

MT. VERNON CARS *Better-Built*

Skilled workmanship is a long-established tradition at the Mt. Vernon car plant. This fact, combined with modern facilities, expert supervision and rigid inspection, results in cars of unsurpassed quality, and the assurance of longer life with less maintenance.

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Complete Line of Freight Cars

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Diesel, Diesel-Electric, Electric, Steam, and Fireless Steam Locomotives.

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To assist manufacturers in using these Airco gases most effectively, Air Reduction provides "on-the-job" technical assistance through its Applied Engineering Field Service Department. For further information on Airco gases—as well as Airco's complete line of apparatus and supplies for every oxyacetylene flame application and arc welding need—call or write the nearest Airco office, or, if you prefer, communicate direct with the New York Office, Department R. A.

OXYGEN guaranteed 99.5% pure . . . assures maximum speed and economy in cutting, and greater efficiency in welding.

ACETYLENE proved by use and test to be the most economical fuel gas for oxyacetylene welding and other flame applications.

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HYDROGEN produced electrolytically, contains less than 0.5% oxygen.

ARGON manufactured pure or mixed with nitrogen as specified by user.

HELIUM is available with a purity of approximately 98% and higher.

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MAGIC CARPET SAFARI

No proud train announcer's booming voice ever rang out with any such chain of stops as makes up the route operated globally today by U.S. railroaders in the Army Transportation Corps.

. . . Naples, Brindisi, Licata, Oran, Fez, Algiers, Bandar Shahpur, Korramshahr, Kaunia Ju, Gauhati, Noumea, Anchorage, Fairbanks. . . .

Why, it sounds like a magic carpet safari, this roll call of places where, in critical 1944, American trainmen are rolling the sinews of war.

Highballing for battle lines over some of the strangest roadbed and under some of the most trying conditions in the world, U.S. railroad men just had to be good. Consider a few of the operating oddities they have faced—

In Alaska, water froze in boilers, crews were marooned on trains by snowdrifts, wheels froze to the tracks.

In India, American soldier-railroaders, taking over part of the Bengal-Assam railway, found at Siliguri the world's broadest-gage rail—5½ feet—connecting with a 2-foot track, which is the world's narrowest.

There, too, wild elephants wreck trains, human sanders squat on the pilot over the rails to drop sand on an upgrade, and dispatching consists of giving the engineer a brass check which allows him to proceed to the next station.

In Iran, American railroaders operate over a single track that literally clings to the sides of cliffs, where 225 tunnels black-out 50 miles of track between the Persian Gulf and Teheran, and bridges number in the thousands.

In Italy, they had to combat a devilish iron hook used effectively by the Germans to rip out tracks.

In North Africa, the rail battalions came face to face with 22 "Pershing" locomotives which the U.S. had shipped to France for service in World War I back 25 years ago.

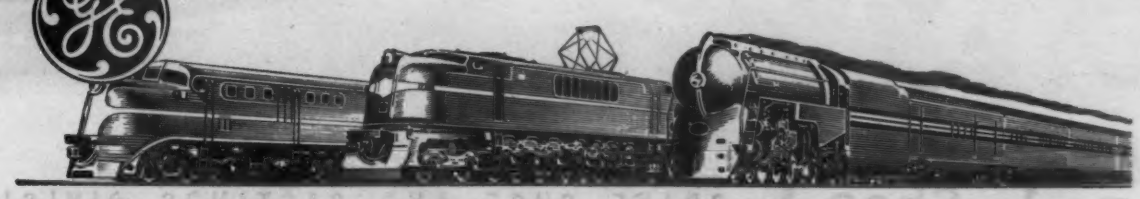
It has taken smart, ingenious railroading to meet conditions as diverse as global warfare makes necessary. Casey Jones, railroadman-of-war, has had it to give.

—*The Trackwalker**

☆ ★ ☆

Alco GE

Dependable motive power for many "magic carpet safaris" is provided by the hundreds of Alco-G.E. diesel-electric and steam locomotives which keep supplies moving from tidewater to foreign fighting fronts in a never ending stream.



AMERICAN LOCOMOTIVE • GENERAL ELECTRIC

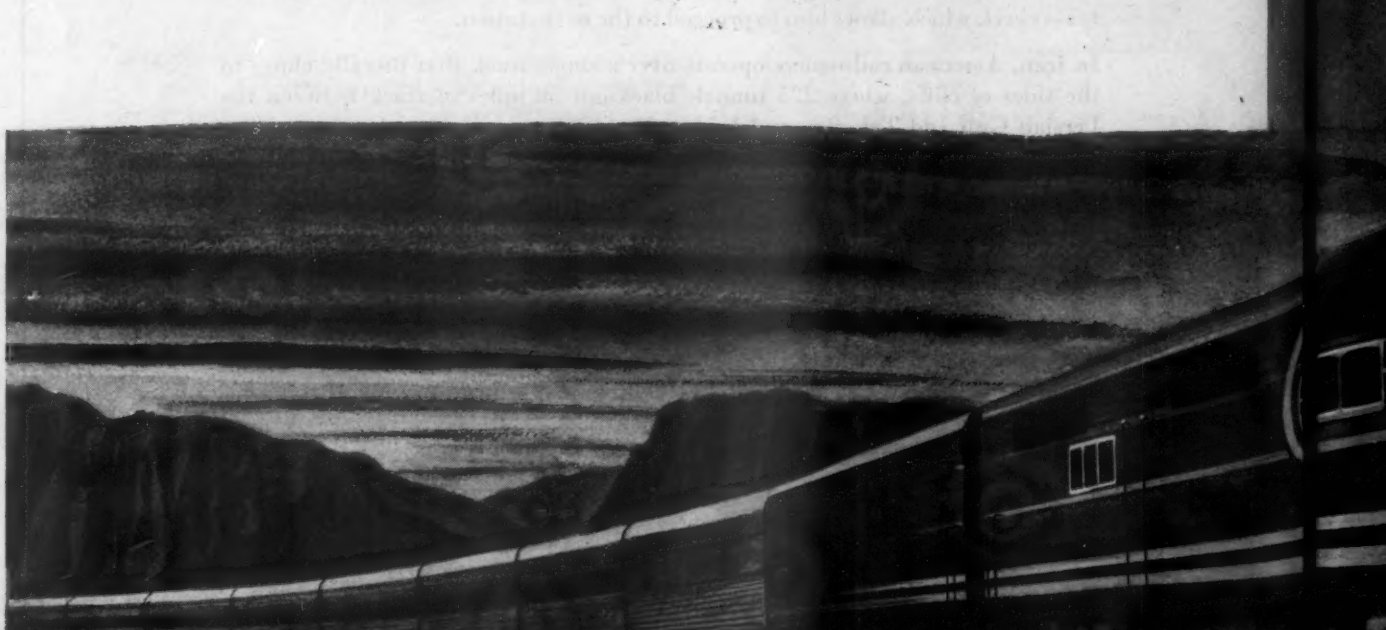
Copr., 1944, American Locomotive Company, and General Electric Company **Reg. U.S. Pat. Off.*

113-90-8800

the AMERICAN BRAKE SHOE

With American Brake Shoe Controller, the brake on any truck is instantaneously and automatically released when a wheel begins to slide and is reapplied when the wheel resumes rolling at normal speed. It is easy to install and maintain and is operated by current from the car lighting generator.

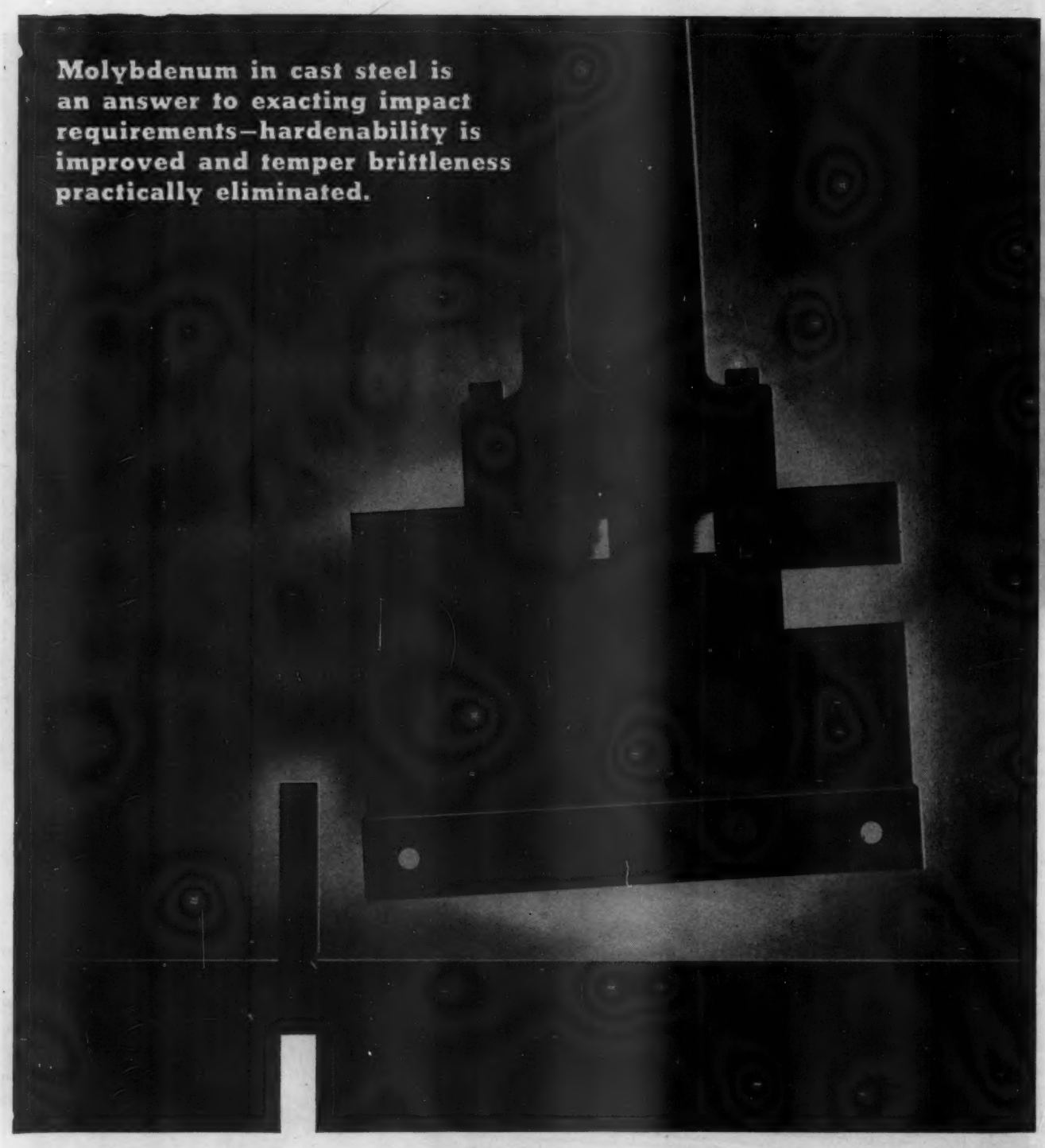
The American Brake Shoe Controller is simple and its action positive. It helps keep cars in revenue service and on time. It relieves the engineer of the wheel slide problem completely and insures minimum stopping distance.



AMERICAN Brake Shoe COMPANY

BRAKE SHOE AND CASTINGS DIVISION

Controller
for high speed passenger equipment,
eliminates wheel sliding . . .



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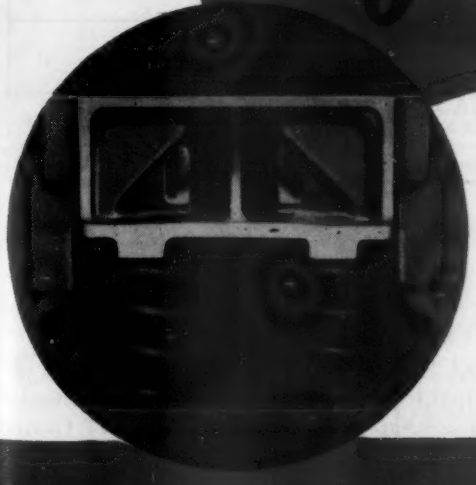
MOLY

THE TRUCK FOR TODAY'S NEED...TOMORROW'S SPEED!

For more MILEAGE and less MAINTENANCE...

Ride-Control!

NO SPRING PLATES
NO SPRING PLANKS



The A. S. F. Ride-Control Truck (A-3) can be depended upon for easy-riding, high-speed service with low maintenance expense. And chief among the reasons-why is the fact that the Ride-Control prevents the development of destructive harmonic oscillation. All bolster motion, both vertically and laterally, is cushioned and controlled by spring pressure to assure smooth, easy operation. Then, too, the Ride-Control Truck is rugged and simple in construction. Without spring plates or spring planks, providing the simplest of assemblies, this truck is designed to keep more freight cars moving, more of the time.

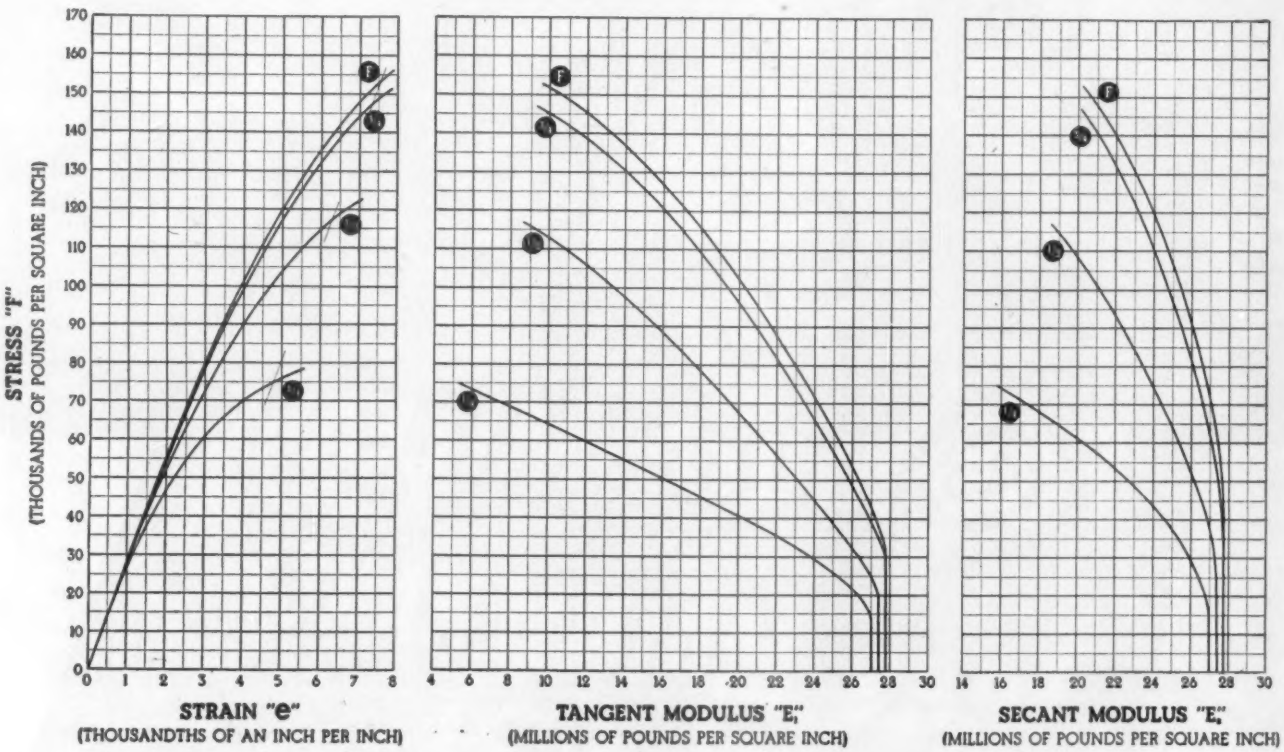
AMERICAN STEEL FOUNDRIES

CHICAGO

MAKE MARK OF FINE CAST STEEL

What the Design Engineer Should Know

ABOUT HIGH TENSILE STAINLESS


STRESS "f"
(THOUSANDS OF POUNDS PER SQUARE INCH)
STRAIN "e"
(THOUSANDTHS OF AN INCH PER INCH)
TANGENT MODULUS "Et"
(MILLIONS OF POUNDS PER SQUARE INCH)
SECANT MODULUS "Es"
(MILLIONS OF POUNDS PER SQUARE INCH)

These curves show the tensile properties of ARMCO High Tensile Stainless Steel Sheets from tests made on longitudinal specimens as cold rolled. They are reproduced from a practical new handbook that contains compression and tension values of high strength stainless for the *complete* useful range.

These data give the designer of railroad equipment the information needed to proportion stronger, lighter structural parts with *less* stainless. Construction of streamlined cars and other light-weight structures demands adequate knowledge of the compressive strengths that can be expected from the materials you use.

Besides the detailed values for stainless, the handbook covers some fundamental concepts of design theory to be considered when using stainless steels at the high stress levels where they are most effective. Mechanical properties of the stainless steels and derived design data are also included in the book.

		¼ Hard	½ Hard	¾ Hard	Full Hard
Ultimate Strength—thousands of lb. per sq. in.	F_{tu}	133	162	183	187
Yield Strength at 0.2% Offset—thousands of lb. per sq. in.	F_{ty}	75	117	147	153
Proportional Limit at 0.01% Offset—thousands of lb. per sq. in.	F_{tp}	35	49	59	61
Initial Modulus of Elasticity—millions of lb. per sq. in.	E_o	27.0	27.5	28.0	28.0
Elongation—per cent in 2 in.		46	37	31	29

If you are a designer of light-weight structures, write us on your company letterhead for a free copy of this handbook. It is titled: "Design Data on High Tensile Stainless Steel Sheets for Structural Purposes." You'll find it a valuable addition to your design manuals. Armco Railroad Sales Co. Incorporated, 2071 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

ARMCO RAILROAD SALES CO. INCORPORATED

300,000,000 miles per year point to this fact...

Alcoa Aluminum is the safe way to lightness

The majority of Greyhound's buses are Alcoa Aluminum

Greyhound's buses run a total of 300,000,000 miles each year. They cover every kind of street and highway—over hills and flat country, rough roads and smooth, at slow and high speeds. What a proving ground for bus construction!

The majority of Greyhound's buses are aluminum, so they've had an excellent opportunity to observe the report on this lightweight construction. Performance has confirmed what they said in announcing their latest aluminum buses in 1940: "larger, stronger, safer than ever."

Aluminum provides a fundamental structural advantage, in that plenty of thickness can be given each part without sacrificing weight saving. Thickness imparts the stiffness which resists bending and buckling, making the structure tough, safe and economical for years of service. The many forms in which aluminum is available permits structural simplicity.

Design and fabricating principles developed before the war have been applied to wartime equipment. Winning the war comes first, of course. But aluminum is now being used for other-than-war purposes, as the manpower situation permits. Our representatives will be glad to discuss the availability of aluminum with you. Write ALUMINUM COMPANY OF AMERICA, 2178 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM

Stay at Your Battle Stations!

MANAGEMENT • LABOR

—the 5th War Loan Drive is still on.

July 29th is the last pay day in the Drive.

The U. S. Treasury has set the overall goal at $16,000,000,000 —$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. The 5th War Loan is a crucial home front battle of tremendous importance to the total war effort.

Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee. He's standing by.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: JOHN DOE MFG. CO.—1,000 Employees

1,000 Employees x $100 . . $100,000 Cash Quota

Regular payroll deductions during the eight weekly payroll accounting periods of June and July. 30,000

$70,000 (to be raised by sales of extra Bonds).

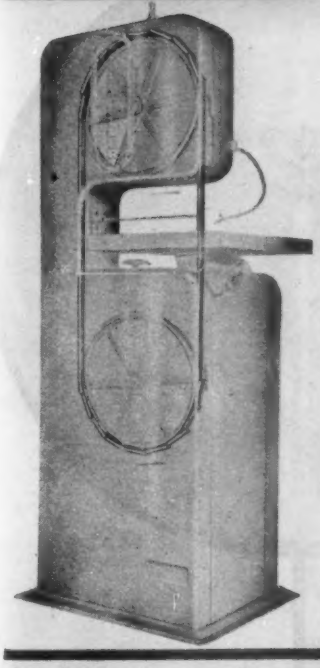
BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by

RAILWAY AGE

★ ★ *This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.* ★ ★

That's right! 7¼ man hours were saved on each Pierce Punching Die for a large aircraft manufacturer. This die is made of plow steel and measures 16 x 15 x 3/16". A ½" flat DoALL File Band was used for the straight surfaces, a ½" oval file for the large radii.



This new DoALL Band Filer is 9 times faster than hand filing—4 times faster than jig filing. Gives you smooth, steady, one-way filing, without back stroking. Saves time, metal and file bands.

Strong support holds file band firm and means more even cutting. Speed-master equipped for variable speed, 50 to 250 f.p.m.

Operators like the roomy, tilting work table and the air jet which keeps it free from dust and chips. Weighs 485 pounds. Occupies only 27 x 34" floor space. Available on M.R.O. priority.

DoALL FILE BANDS

Ready to prove their worth. 12 standard styles to file different kinds of metals, alloys, laminates, plastics. Made to fit the new DoALL Filer or any model DoALL Contour Machine.

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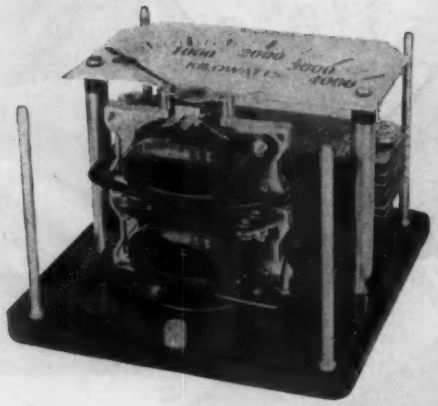

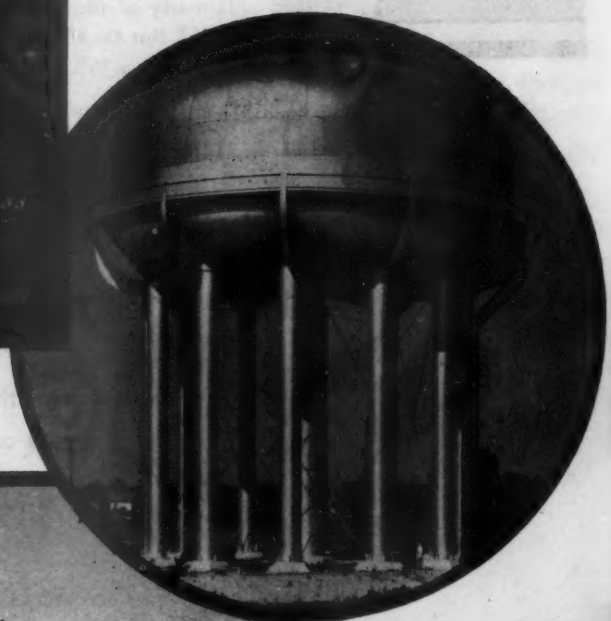

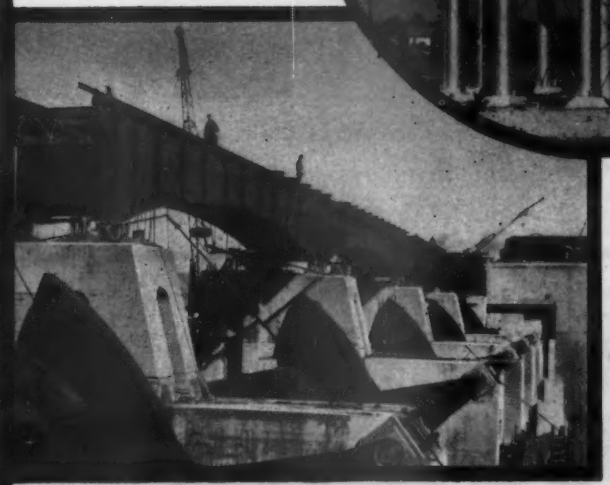

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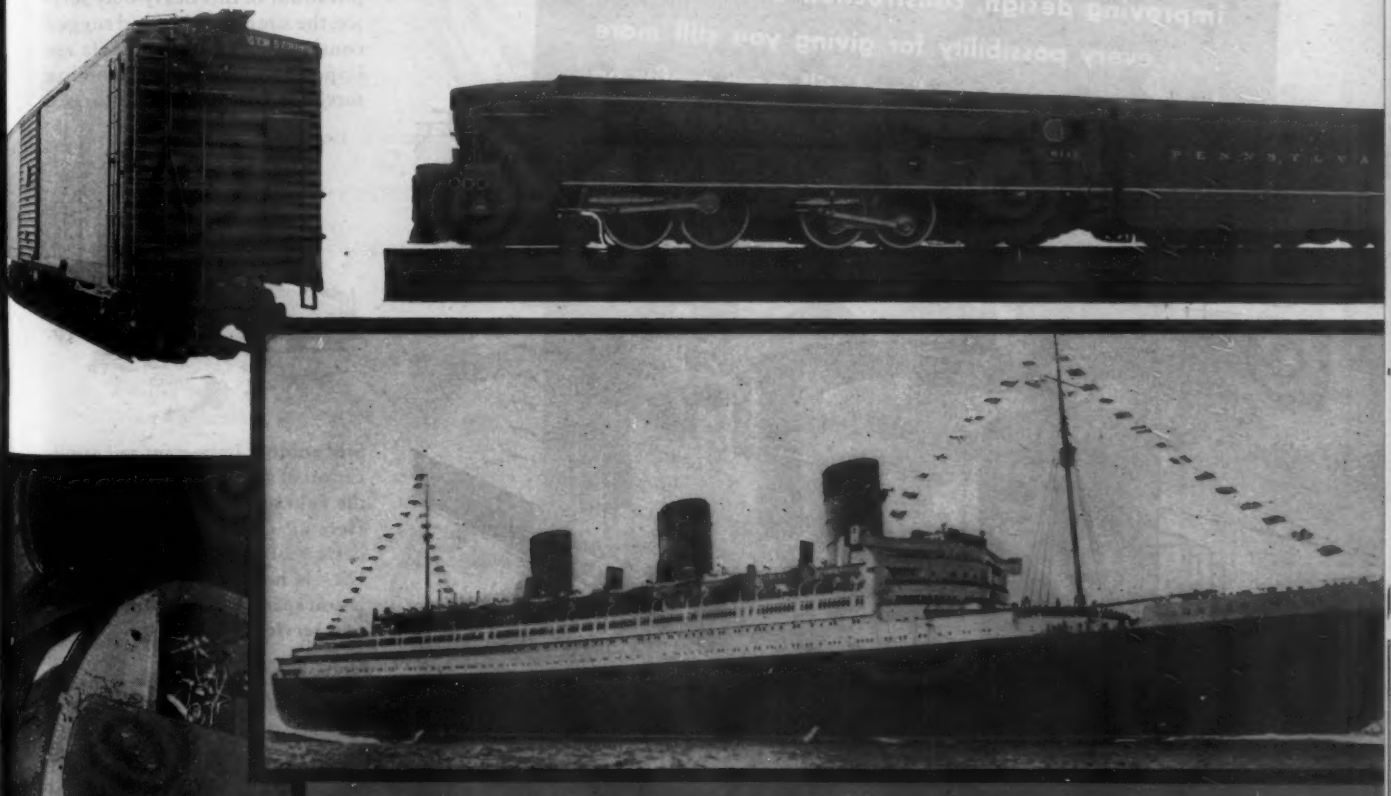
ASSURE MAXIMUM SECURITY DEPENDABILITY, ECONOMY

The engineers who designed the products shown here have made good use of the time-proven security and economy of bolts, rivets and screws.

Sleek ocean liners, vital railroad signal towers, great bridges, sensitive precision instruments, modern household appliances, aircraft of all types and sizes employ headed and threaded fasteners to firmly and dependably hold together their component parts.

Constant improvements are being made in the design and manufacture of headed and threaded products, increasing their usefulness, economy and dependability for all types of service. Interchangeability is assured by accurate mass-production methods.

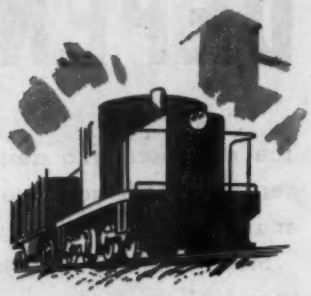


AMERICAN INSTITUTE OF
BOLT, NUT and RIVET MANUFACTURERS
1550 HANNA BUILDING · CLEVELAND 15, OHIO

The End is Not in Sight

Even a casual comparison of the massive, lumbering diesel of yesterday with a trim, compact, modern-day Cummins Diesel will show that the diesel engine has come a long way in the 26 years that Cummins has been in the business. Yet, the end is not in sight because the same kind of thinking that led to Cummins' development of the original high speed diesel more than a decade ago promises still greater achievements in power efficiency tomorrow. This thinking is characterized by its refusal to become "set in its ways" . . . by its determination to fully explore every possibility for improving design, construction and materials . . . every possibility for giving you still more horsepower per pound and still more profits on your job through high speed diesels. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

Economy of weight and space are two important advantages offered by the use of Cummins Diesel Generating Sets as auxiliary power for modern, streamlined passenger trains. Another is their flexibility, which assures a steady flow of current to meet every fluctuation in load.



In mainline, switching, and industrial locomotives, Cummins Diesels find a made-to-order application. In this heavy-duty service, the simple design and rugged construction of these diesels are important factors in reducing service delays and repair charges.

Still another important rail application of Cummins Diesels lies in the field of modern motor trains. Here again, the simple, compact design of high speed Cummins Diesels holds weight and installation space to the minimum. Fuel and service costs are low.

A partial list of railroads now using Cummins Dependable Diesels:

Pennsylvania • New York Central
Reading • Seaboard
Chicago, Burlington & Quincy
Grand Trunk Western
Baltimore & Ohio
Consolidated of Cuba
United of Havana
Colombian State Railways
Bermuda Railway

Keeping pace with the new era in Transportation

The distinguished service American railroads have rendered in handling our huge wartime volume of men and materiel portends a new era in rail transportation. Fleets of new trains will carry an increasing volume of travelers who have patriotically refrained from adding to our traffic burden.

Instead of transporting the cruel tools of war . . . and men and women in uniform . . . throngs will wish to relax in luxurious travel. War workers, for whom vacations have been impossible, will wish to recoup in fullest measure from the privation and restriction of wartime.

To meet the demand for luxurious travel comfort...GF skilled craftsmen will make GoodForm Aluminum Seating available that will keep pace with every transportation improvement . . . as soon as men and metal are released.

The General Fireproofing Company

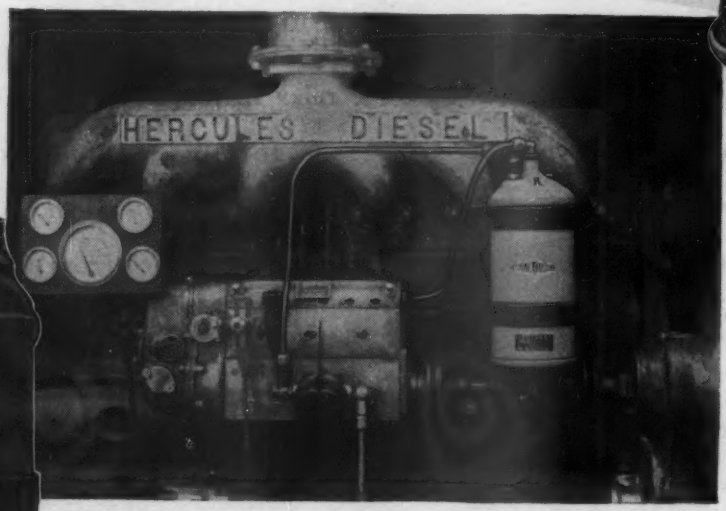
Youngstown 1, Ohio

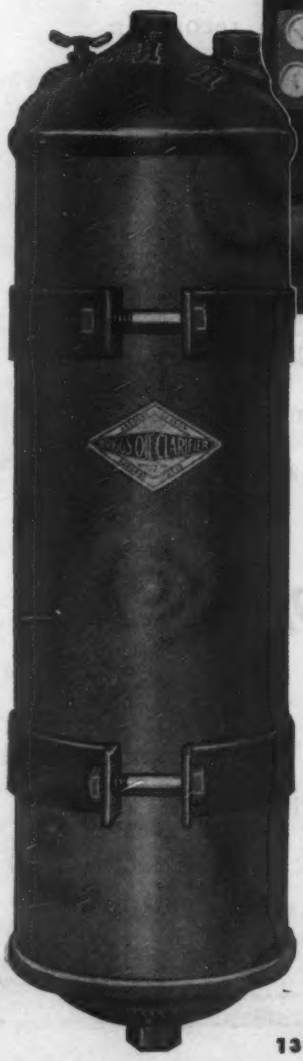
SPECIFY THESE BRIGGS *Fuel Oil* FILTERS

for Diesel Engines consuming less than 10 gallons per hour—

MODEL F-5 for maximum fuel consumption of 5 gallons per hour

MODEL F-10 for maximum fuel consumption of 10 gallons per hour





Small compact design permits installation at side of engine. Especially adaptable to mobile Diesels used in trucks, buses, tractors, drag lines, cranes, field pump units, portable and stationary power plant units, marine auxiliaries, etc. Supplied with heavy gauge steel mounting brackets. Simple to install on any engine.

These Briggs Fuel Oil Filters feature the Briggs Patented Molded Fullers Earth Block in combination with fibrous cellulose . . . the filtering combination that CLEANS OIL 3 TIMES IN 3 WAYS.

1. **PHYSICALLY CLEAN**—dirt is removed by ABsorption through cellulose.
2. **CHEMICALLY PURE**—acids, gums, resins, asphalt are removed by ADsorption through Fullers Earth.
3. **VISIBLY CLEAN**—particles as small as 7 microns (.0003″) are removed by ABsorption through second layer of cellulose.

Remember—fuel oil leaves the refinery in perfect condition, but it DOES oxidize and become contaminated in storage. Briggs Fuel Oil Clarifiers offer 100% protection against engine shut-down due to contaminated and dirty fuel.

For complete information on these and larger Briggs Fuel Oil Clarifiers see the Briggs distributor in your territory.

Briggs

PIONEERS IN MODERN OIL FILTRATION

BRIGGS CLARIFIER COMPANY

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It isn't necessary—now—to *over*design to assure adequate safety factors where exact service stresses can't be predicted.

A device as small as your little fingernail, cemented in place on any plane or curved surface, can tell you exactly *what* is happening . . . *at the instant it happens.* Check your test requirements against this list of jobs the SR-4 is doing.

1 Testing structures or machines under steady load conditions

The SR-4 accurately measures static strains down to 1 part in 2,000,000, (Equivalent to 15 lb. sq. in. stress in steel.) and exhibits perfect linearity, even in the plastic range.

2 High temperature testing under steady load conditions

Standard Phenol-resin bonded gages are serviceable up to 500° F and with small loss in accuracy up to 700° F.

3 Testing structures or machines under varying load conditions

The SR-4 handles frequencies ranging from 0 to 30,000 per second, with no loss of linearity.

4 High temperature testing under varying load conditions

No loss of accuracy or sensitivity is entailed. Measurements in the presence of hot oil have been successfully made.

Tests on the production floor or in the field can be made as easily and accurately as in the laboratory. The SR-4 can solve some worrisome problems for you. The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia, Penna., U. S. A.

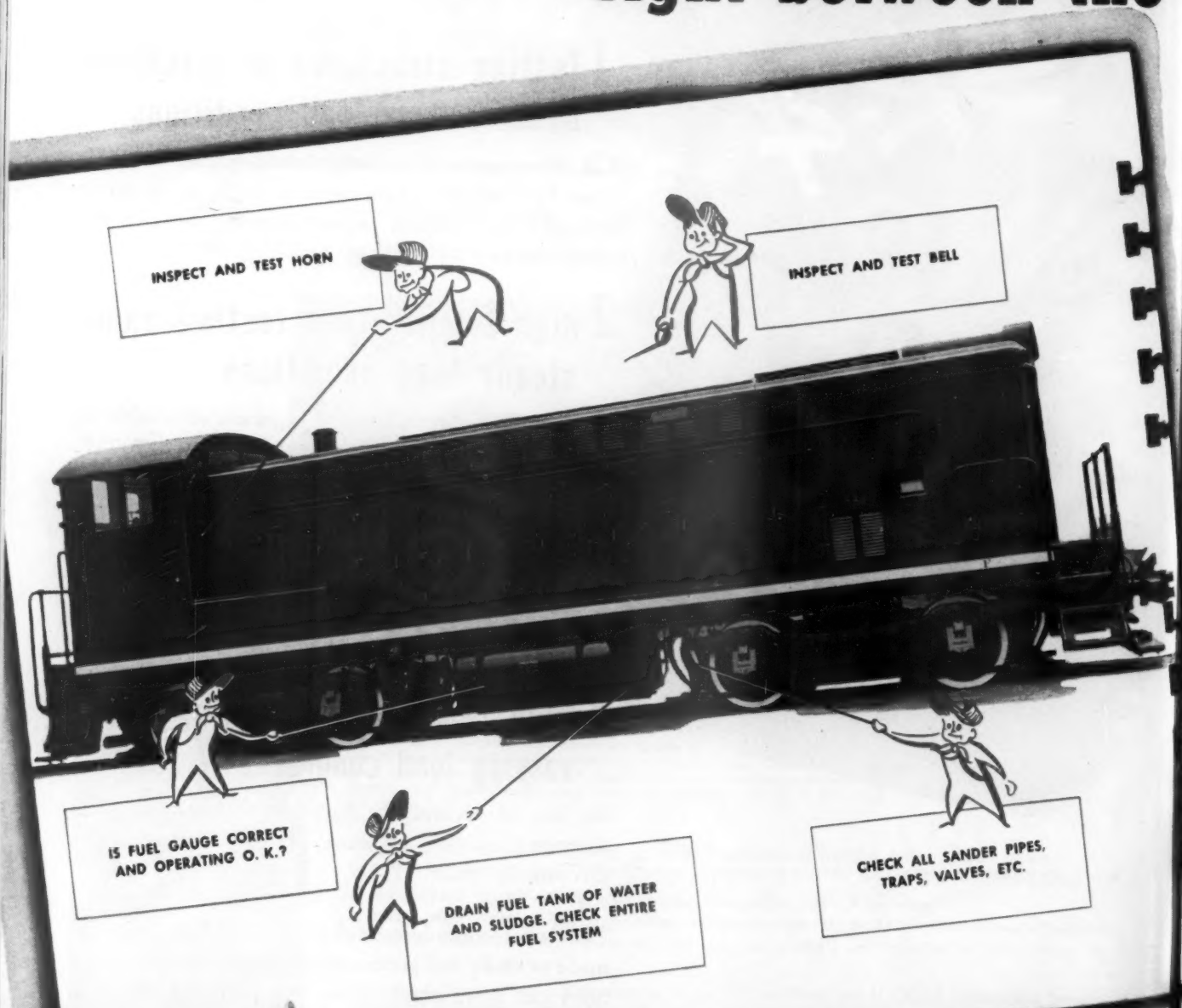
No. 165—Torquemeter
No. 169—Portable Strain Indicator
No. 170—Strain Recorder
No. 171—Applications
No. 172—Scanning Recording Equipment
No. 174—Applications to Shipyard Problems
No. 175—Bonded Resistance Wire Strain Gage

BLW THE BALDWIN GROUP

BALDWIN
SOUTHWARK
TESTING EQUIPMENT

Thousands of extra

right between the


INSPECT AND TEST HORN
INSPECT AND TEST BELL
IS FUEL GAUGE CORRECT AND OPERATING O. K.?
DRAIN FUEL TANK OF WATER AND SLUDGE. CHECK ENTIRE FUEL SYSTEM
CHECK ALL SANDER PIPES, TRAPS, VALVES, ETC.

Since 1893 Baldwin and Westinghouse have pooled their experience in building electric and diesel-electric locomotives

BLW THE BALDWIN GROUP

BALDWIN

DIESEL-ELECTRIC

miles of service

pages of a little book

This new check-chart inspection system puts a call-boy in every cab, reminds your maintenance crews of the periodical examinations and adjustments that assure the "ounce of prevention." Thousands of extra miles of service from your Baldwin-Westinghouse locomotives are waiting, right between the pages of this little book. Just fill out the coupon for full details.

BALDWIN-WESTINGHOUSE

INSPECTION TIPS

TELL YOU WHAT TO DO

DAILY . . . MONTHLY

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LOCOMOTIVES

THE BALDWIN LOCOMOTIVE WORKS
Advertising Department
Paschall P. O., Phila. 42, Pa.

Please send information on your inspection and maintenance checking system.

NAME_____

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COMPANY_____

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A CONSISTENT SOURCE OF SUPPLY

When George Washington was elected President of United States for the second time, Standard Steel Works, as "Freedom Forge", started on its historic career of service to American industry. Through war emergencies and commercial depressions this company has produced quality steel products for railroads, marine service and general industry. The traditions of this 149-year-old organization give its personnel a wealth of experience and a sense of responsibility that are reflected in the quality of its products. THE BALDWIN LOCOMOTIVE WORKS, STANDARD STEEL WORKS DIVISION, BURNHAM, PA., U. S. A. DISTRICT OFFICES: Philadelphia, New York, Washington, Boston, Cleveland, Chicago, St. Louis, Houston, San Francisco.

BALDWIN PRODUCTS

Hydraulic presses, Testing equipment, Steel forgings and castings, Diesel electric locomotives, Diesel engines, Metal plate fabrication, Rolled steel rings, Bronze castings, Heavy machine work, Crane wheels, Bending rolls, Plate planers, Babbitt metal, Alloy iron castings, Briquetting presses

ARMY NAVY

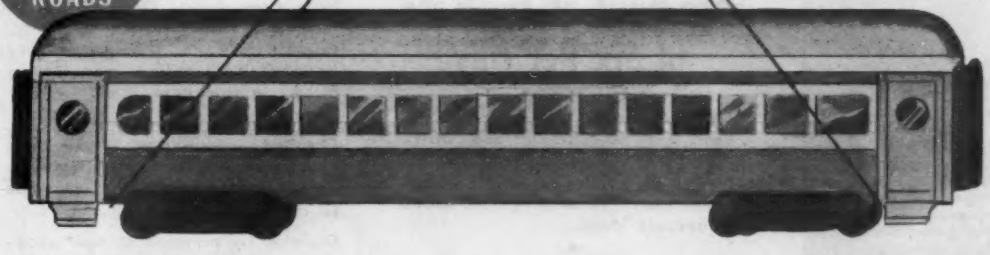
BLW THE BALDWIN GROUP

BALDWIN
STANDARD
STEEL FORGINGS & CASTINGS

Lighter Stronger Better

There is no safer brake beam suspension than Schaefer loop brake beam hangers

STANDARD ON MOST ROADS



Schaefer Light Weight Design Insures More Than Car Life

When your freight car repair program is under consideration you can be certain that Schaefer Service will meet your delivery requirements.

Schaefer EQUIPMENT COMPANY

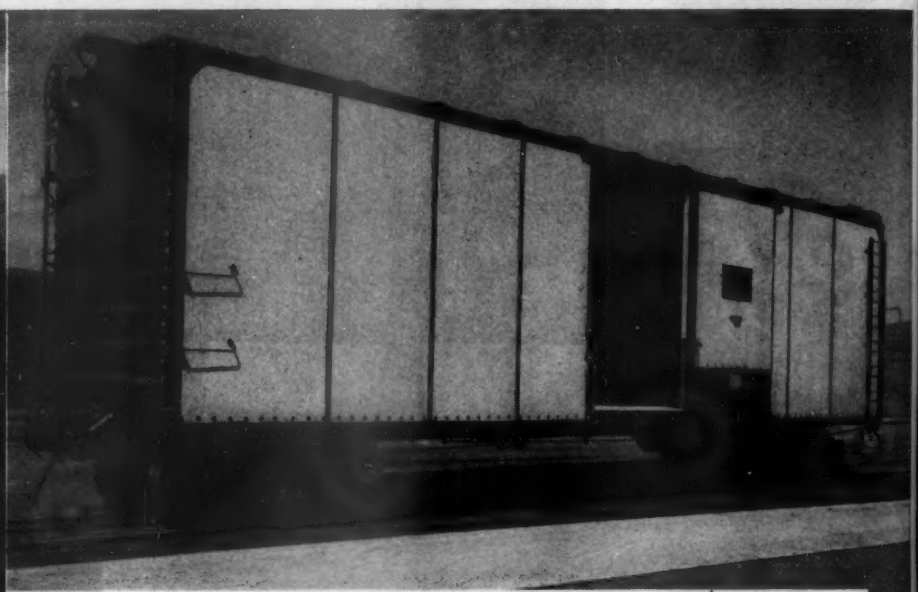
KOPPERS BUILDING • PITTSBURGH, PA.

LOOP, "U" AND STIRRUP TYPE BRAKE BEAM HANGERS... TRUCK, CYLINDER AND FLOATING LEVERS
TRUCK LEVER CONNECTIONS... BRAKE ROD JAWS... WEAR PLATES... BRAKE SHOE KEYS

NEW GREAT NORTHERN BOXCARS OF DOUGLAS FIR PLYWOOD

ARE TWO TONS LIGHTER - - ON THE AVERAGE - - THAN CONVENTIONAL FREIGHT CARS

The new plywood cars are painted "Great Northern Orange" to distinguish them from the conventional freight car. Plywood sheathing is placed on steel underframe and superstructure.



Inside and outside sheathings of the Great Northern's new freight cars are of 5/8 inch Douglas fir plywood. The panels are here being applied to the steel and lumber superstructure. The plywood was rigidly tested for strength and durability before acceptance.

Interior walls and ceilings were lined with panels of 5/8 inch plywood, producing this smooth effect. Because Douglas fir plywood is available in panel form, construction time was greatly reduced.

1,000 Plywood Cars Are Built at the Rate of Six Per Day

'Durable Douglas fir plywood was used for all outside and inside sheathings, including the ceiling, on 1,000 freight cars built at the Great Northern railway's St. Cloud Minnesota shops.

•

"The combination of Douglas fir plywood, steel and lumber produces a freight car which averages two tons lighter than the average conventional steel box car," says F. J. Gavin, president of the Great Northern railroad.

Exterior type Douglas fir plywood (the plywood made with permanently waterproof binder) was specified throughout. Outside panels, 5/8" thick, are installed vertically; inside panels, 5/8" thick, are placed horizontally; ceiling panels are 5/16" in thickness.

•

Detailed information is available from the Association's engineers concerning application of plywood to many railroad uses.

Douglas fir plywood is now available only on highest priorities. Application for allocation must be made by suppliers to the War Production Board.

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

PLYPANEL D.F.P.A. TRADE MARK REG. U. S. PAT. OFF.

GENUINE PLYSCORD SHEATHING D. F. P. A. INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D. F. P. A. INSPECTED

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D. F. P. A. INSPECTED

EXT.-D.F.P.A. TRADE MARK REG. U. S. PAT. OFF.

DOUGLAS FIR PLYWOOD
LARGE. LIGHT. STRONG.
Real Wood PANELS

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

MILL CASTINGS BY PSF

for years a Standard of

STEEL MAKERS

There's hardly a blast furnace operating today that does not use PSF equipment. We're building a lot for export, too. Many of the items have advantages of design—all of them have the clean, sound structure and highly accurate machining that our modern facilities make possible. For *value* in steel castings, specify "PSF".

46 YEARS OF STEEL CASTING KNOWLEDGE

Pittsburgh

STEEL FOUNDRY CORPORATION

GLASSPORT, PA.

Sales Offices: NEW YORK • PHILADELPHIA • WASHINGTON AND CHICAGO

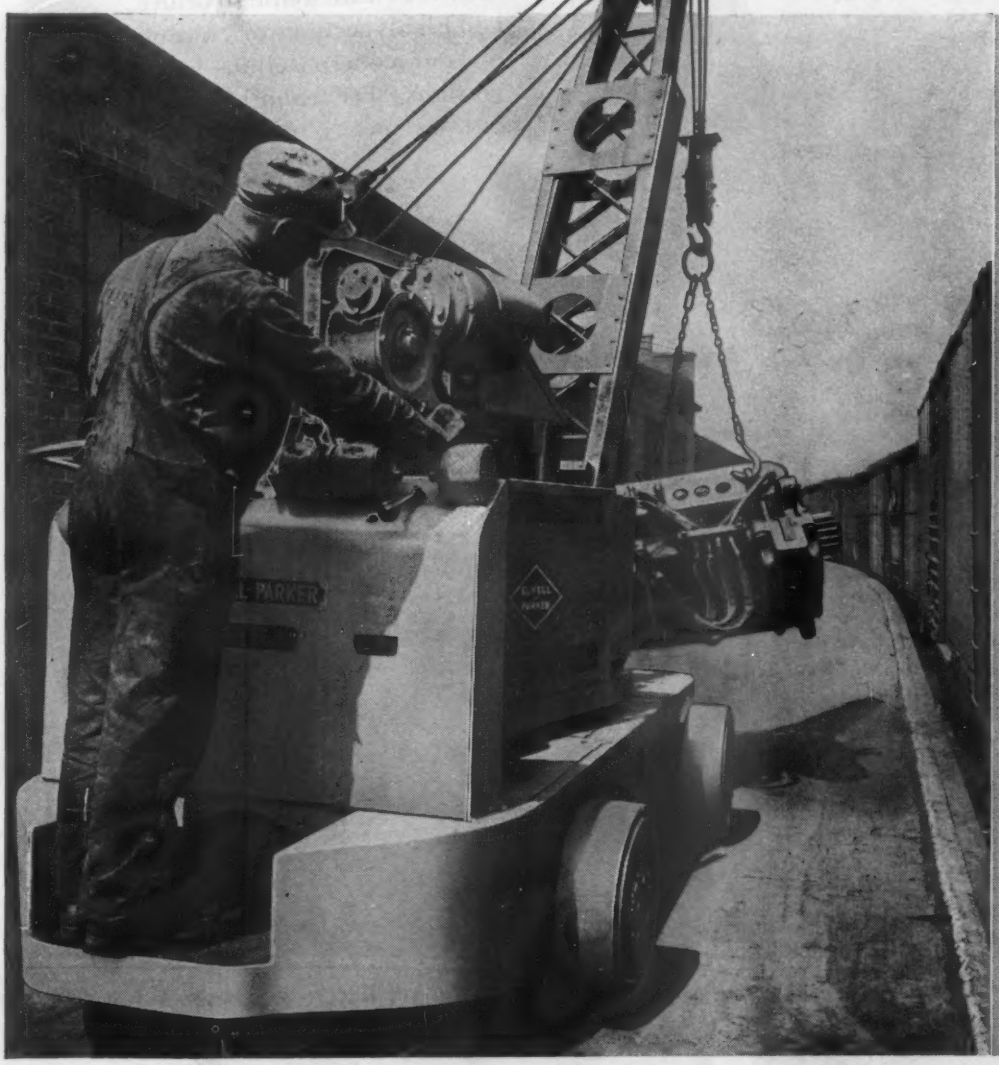
Gangway for Motive Power!

There goes an electric motor fresh from reconditioning—a compact bundle of motive power, highballing on a husky Elwell-Parker Crane with a one-man crew at the controls for delivery to the waiting Diesel. It gives you plenty of confidence that jobs will go through on schedule, when you have dependable Elwell-Parkers on call.

Your choice of big, sturdy Cranes like this one, or Trucks with attachments designed especially for work in your Shops or Stores Departments. Elwell-Parker has been designing and building equipment for the Roads for years—many Units installed in Roundhouse and Terminal jobs before 1920 are working 3 shifts today.

Have you talked with the E-P Man lately? It will pay you to look him up—here is his telephone address.

Dial the E-P Man today. The Elwell-Parker Electric Company, 4250 St. Clair Avenue, Cleveland 14, Ohio.



DIAL THE E-P MAN TODAY!

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Birmingham	3-3323
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Buffalo	GR 7664
Charlotte	5026
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Cleveland	MA 8915
Columbus	AD 4824
Denver	KE 5500
Detroit	MA 2233
Ft. Worth	4-6184
Greenville	534
Indianapolis	LI 3131
Jacksonville	5-1384
Kansas City	VA 7021
Los Angeles	PR 5911
Memphis	8-1648
Milwaukee	MA 7817
Minneapolis	GE 3247
Montreal	HA 7191
New York	COR 7-0797
NewOrleans,	MA 6316-C
Philadelphia	LO 3710
Pittsburgh	AT 6734
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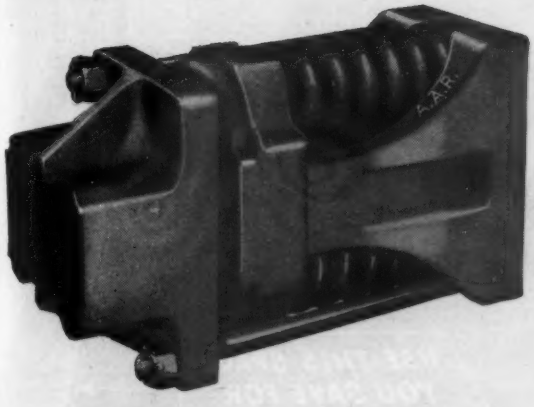
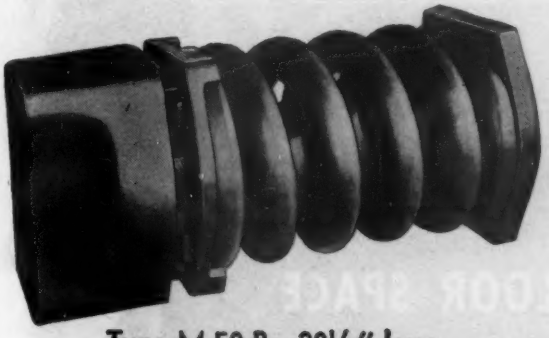
ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

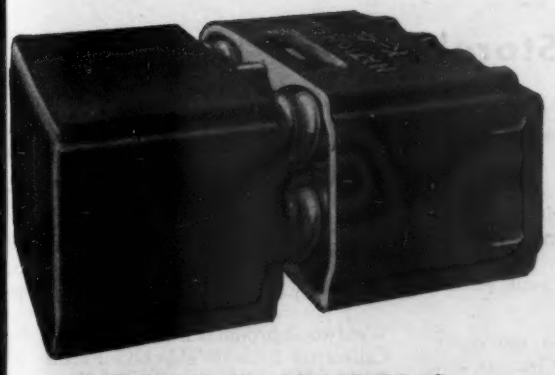
Car & Lading Protection



Type M-17-A—22⅜" long
A.A.R. Approved



Type M-50-B—20⅛" long
A.A.R. Approved



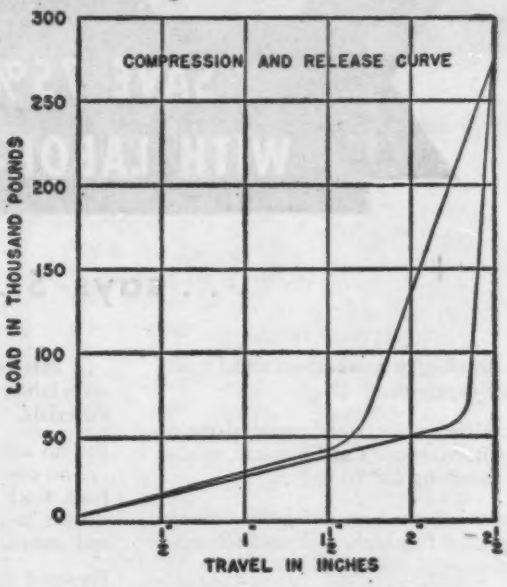
NATIONAL K-4 DRAFT GEAR
Designed especially to meet the requirements of high speed passenger service.

Heavier loads, longer trains and higher speeds make new demands on every item of freight car equipment.

Draft gears especially must be able to stand terrific punishment if they are to provide proper protection to the car and its contents.

NATIONAL FRICTION DRAFT GEARS

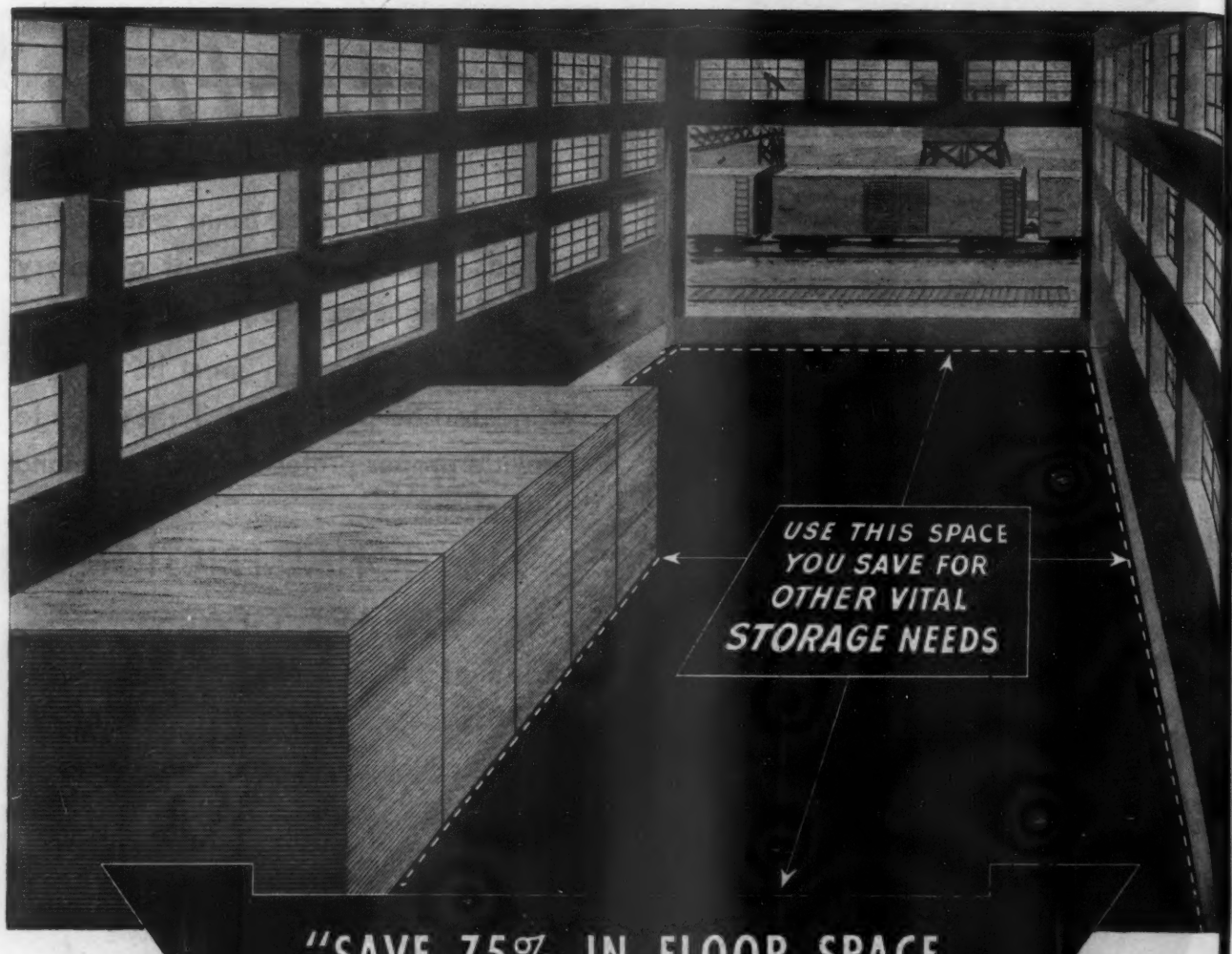
made of Naco Steel are designed to meet these extreme conditions. Their smooth action and high ultimate capacity affords the greatest protection to the car and lading.



Closure chart for Type K-4 Gears

Specify NATIONAL Draft Gears for efficient, economical service.

NATIONAL MALLEABLE AND STEEL CASTINGS CO.
General Offices: CLEVELAND, OHIO
Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.



"SAVE 75% IN FLOOR SPACE WITH LABOR-SAVING PLYWOOD!"

. . . says St. Louis Storekeeper

This storekeeper speaks from actual space-saving experience.

E. L. Krietemeier, storekeeper of the St. Louis Refrigerator Car Company, needed roof sheathing for 50 reefers.

He found that tongue-and-groove sheathing piled 8 feet high, took up 216 square feet.

For this same job, a sufficient amount of plywood, piled only 7 feet high, needed only 50 square feet! *A saving of more than 75% of vital floor space!*

Plywood speeds up shop operations, too . . . cuts out unnecessary handling . . . saves labor, time and money . . . conserves materials.

For no milling is needed with plywood . . . no costly labor time to move lumber from stock piles, to load up trucks and deliver to the mill, then to mill, reload and return.

Plywood can be ordered in the exact measurements you specify. Its easy-to-handle "big sheets" save you as much as 19% in nails.

And pound for pound, it's stronger than steel!

For all these advantages inherent in plywood . . . and many more . . . storekeepers are banking on the world's largest producers of plywood.

For under the Weldwood trademark you'll find a wide assortment of plywoods that meet every railroad need and specification.

Weldwood products include Douglas Fir, California Pine, Weldwood Panels and Weldwood Utility Panels, metal covered plywoods (Armorply*) and Flexwood*.

For full information, write or phone today.

*Reg. U.S. Pat. Off.

WELDWOOD Plywood

Weldwood Plywood and Plywood Products are manufactured and marketed by

UNITED STATES PLYWOOD CORPORATION, New York, N. Y.

Distributing units in Boston, Brooklyn, Chicago, Cincinnati, Cleveland, Detroit, High Point, Los Angeles, Louisville, Newark, New York, Oakland, Philadelphia, Rochester, San Francisco, Seattle . . . Send inquiries to nearest point.

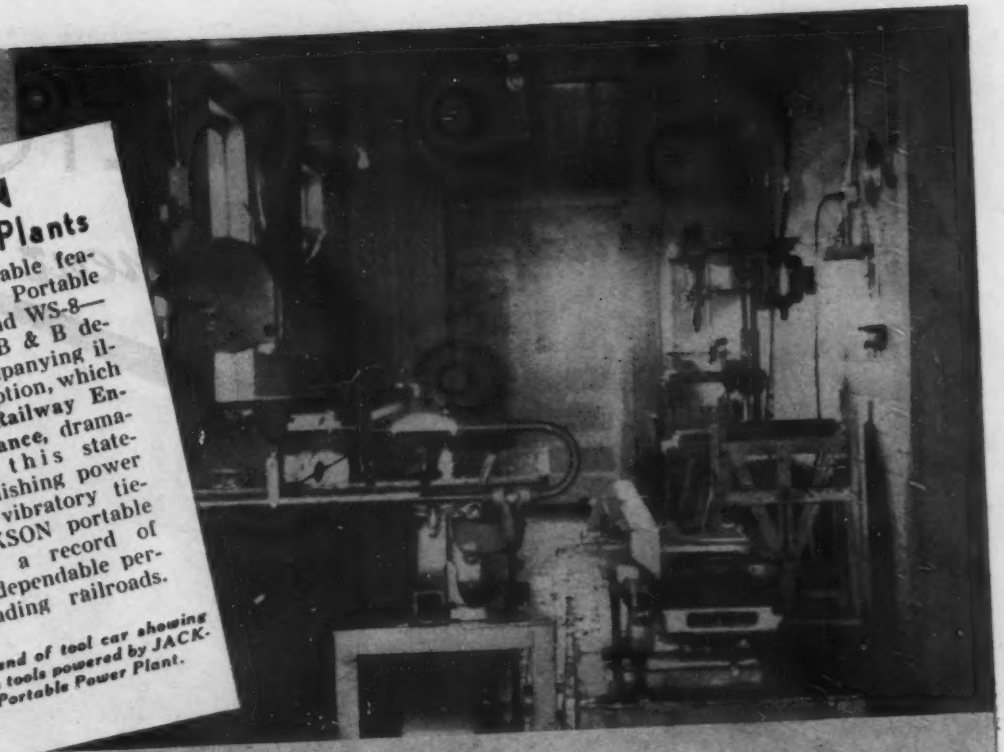
Waterproof Weldwood, so marked, is bonded with phenol formaldehyde synthetic resin. Other types of water-resistant Weldwood are manufactured with extended urea resins and other approved bonding agents. Back of these Weldwood Products are unmatched facilities and experience in Plywood production and fabrication.

Plastic and Wood Welded for Good

JACKSON
Portable Power Plants

The portable and adaptable features of JACKSON Portable Power Plants—WS-4 and WS-8—simplify the work of B & B departments. The accompanying illustrations and description, which appeared in March Railway Engineering & Maintenance, dramatically demonstrate this statement. And, in furnishing power for JACKSON vibratory tie-tampers, the JACKSON portable power outfit has a record of nearly 25 years' dependable performance on leading railroads.

Working end of tool car showing numerous tools powered by JACKSON Portable Power Plant.



Power Tool Cars Speed Building Work on the Frisco

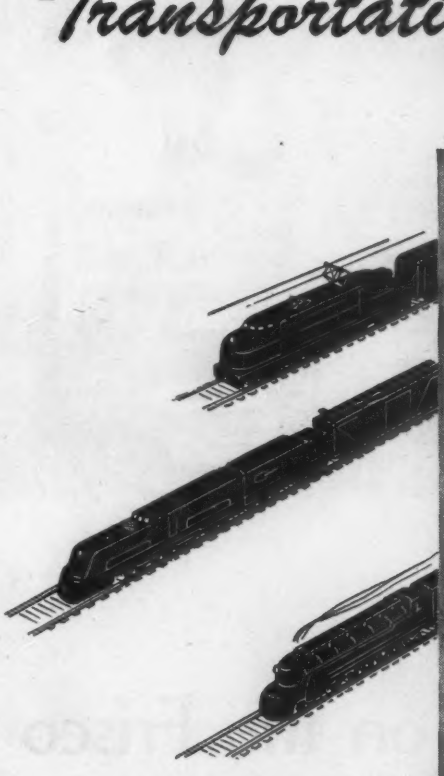
Power Unit

Power for all the equipment and tools in the car and for lighting is furnished by a WS-8 portable Jackson power unit. This unit has two wheels and a pedestal type leg. It is bolted to the floor but can be removed for use in emergency work or as a power unit for the portable tools when it becomes necessary to use them at points remote from the car. It has a Wisconsin-type VE-4 engine of about 12 hp. capacity and a generator with an output of 5 k.v.a. of 120-volt, 60-cycle a-c. current with both 3-phase and single-phase outlets. This power plant has sufficient capacity to operate all the power equipment in the car at the same time.

Above—Close-up of the Power Unit. Below—The Power End of the Car, with Jointer and Table Saw in Foreground. The Power Unit is Located in the Corner Behind the Saw

ELECTRIC
TAMPER & EQUIPMENT
CO.
LUDINGTON, MICHIGAN

For LIGHTWEIGHT
Transportation Equipment



N-A-X
HIGH TENSILE

DUCTILITY
ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE
STRENGTH

IT HAS

1. High Strength and Impact Properties
2. Outstanding Ductility
3. High Vibration Fatigue Resistance
4. Excellent Welding Characteristics

Send for booklet describing N-A-X HIGH TENSILE
and N-A-X 9100 SERIES ALLOY STEELS

GREAT LAKES STEEL CORPORATION

DETROIT, MICHIGAN

Sales Offices in Principal Cities

Division of **NATIONAL STEEL CORPORATION** *Executive Offices, Pittsburgh, Pa.*

W. J. HALLIGAN, *President,*
Hallicrafters Radio . . .

Mr. Halligan says, "Those of us who are building radio communications equipment in this war anticipate a tremendous demand in the future for radios and radio telephones for plane to ground, ship to shore use, and many other applications."

"COMMUNICATIONS EQUIPMENT IS ONLY AS GOOD AS ITS POWER SUPPLY"

"Radio equipment needs an efficient, reliable power supply," continues Mr. Halligan, "And for that reason, the radio industry is constantly on the alert for new and better power supplies and devices for adapting current for radio use. Such power supplies and such devices are of inestimable value to the communications equipment manufacturer."

Electronic Laboratories has vibrator power supplies for use wherever current must be changed in voltage, frequency or type, or will engineer one to fit specific space, weight and voltage requirements. E•L Vibrator Power Supplies offer many advantages for all current conversion requirements up to 1500 watts as a result of development in circuits and design pioneered and perfected by Electronic Laboratories. E•L Power Supplies are definitely more efficient, and give substantially longer service life. In addition, they are highly versatile, permitting multiple inputs and outputs, any needed wave-form, great flexibility in shape and size, and a high degree of voltage regulation when needed. They are economical in price and require almost no attention or maintenance. Their dependability is being demonstrated everyday on the fighting fronts. E•L engineers offer consultation on power supply problems.

E•L STANDARD POWER SUPPLY MODEL 146

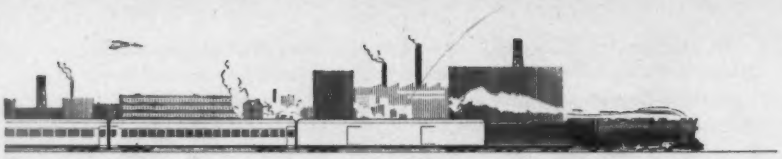
For the operation of 115 volt AC radio receivers, public address, and inter-communication systems, and other electrical equipment needing power up to 350 watts. Characteristics: Input voltage, 32 v. DC; Output voltage, 115 v. AC; Output power, 350 watts; Output frequency, 60 cycles; Load Power Factor, 80—100%.

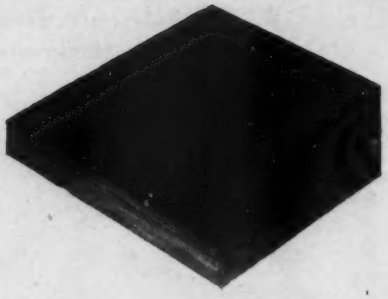
Dimensions: 8¾x10x16 in. . . . . *Weight:* 48 pounds

Other models for output wattages at 115 volts AC from 6, 12, 32, 115, and 230 volts DC inputs.

Electronic LABORATORIES INC.
INDIANAPOLIS

VIBRATOR POWER SUPPLIES FOR LIGHTING, COMMUNICATIONS, AND ELECTRIC MOTOR OPERATION • ELECTRIC, ELECTRONIC AND OTHER EQUIPMENT





WIDE USE OF FABREEKA by RAILROADS EXTENDED to WAR EQUIPMENT

FABREEKA is a material of limited resiliency, having a minimum of permanent set; with high damping, great strength and long life.

First used by the Railroad Industry to absorb shock, vibration and noise, FABREEKA is now widely used for the same purpose by the Armed Forces. This wartime experience will be available to the Railroads in solving many mechanical and engineering problems.

The M8 . . . a 75m/m Howitzer Carrier . . . uses FABREEKA for three important applications: as Interphone Box Mounting, Terminal Box Mounting and as Dome Light Mounting. FABREEKA units absorb shock and vibration and thus reduce breakage and mechanical wear.

FABREEKA

FOR IMPACT SHOCK AND VIBRATION

FABREEKA PRODUCTS COMPANY
Incorporated
BOSTON 10, MASS.

WAR PAINT
for fighting railroads

● America's railroads are rolling to victory. The responsibility of transporting tremendous tonnages of war goods is being met with outstanding efficiency. The whole nation is grateful for this magnificent war job which the railroads are doing.

Because Glidden has recognized the vital importance of the railroads to the war effort, we have placed our railroad customers on a "preferred" basis, with special provisions for prompt, efficient service.

A specific example of Glidden Railroad Technical Service is TWO-A-DAY car painting which has greatly reduced time-out for painting.

Glidden's specialized experience with railroad paint problems is available to the entire industry. Eight strategically located plants and research laboratories make service quickly available, wherever you are located.

Inquiries are invited on specific problems, current or postwar. Just drop us a line.

THE GLIDDEN COMPANY • Cleveland 2, Ohio

TIME-TESTED

TWO-A-DAY
FREIGHT CAR PAINT

Glidden has developed a special freight car paint which can be applied two coats a day. The trick, of course, is quick drying. This TWO-A-DAY paint gets cars in and out of the shop—*fast!* In addition to its drying speed, Glidden TWO-A-DAY paint provides great durability, protection and all other essential properties of an ideal railroad maintenance paint.

GLIDDEN *Pacemaker in Paints*

YOU have made Pullman-Standard-built streamlined trains the most popular and profitable trains in America. By your overwhelming patronage you confirmed our faith in this type of modern equipment and justified the railroads' resolution to put an ever-increasing number into postwar service.

...Pullman-Standard
CREATED STREAMLINED RAILROAD CARS

THE ROOMETTE
This most popular of travel innovations provides the luxury of a private air-conditioned room with wardrobe, a full-sized bed, concealed toilet facilities and individual temperature control.

Almost three-fourths of *all* streamlined cars purchased have been built by Pullman-Standard.

FOR 10 solid years—ever since they were placed in operation—lightweight streamlined trains built by Pullman-Standard have been continuously "on the go", serving the public, loaded to capacity, without a single hour's operating loss to the railroads due to structural failure—proof of Pullman-Standard's traditionally sound engineering principles.

Here is stirring evidence that "modern lightweight" has met and mastered the brutal heavy-duty test of wartime transportation—conclusive proof to the public and the railroads that cars of this type are the answer to the railroads' postwar transportation problems.

Postwar Trains Will Be Even More Popular

Expect great things. Even finer lightweight trains—and more of them—with many innovations to make your railroad journeys much more pleasurable. Expect more for your money—smoother riding at high speeds—comfort and convenience beyond anything you have yet experienced. For the railroads and Pullman-Standard have definite plans for your more luxurious travel—in coaches, dining cars, recreation and sleeping cars.

Even though our present efforts are dedicated entirely to the armament program, Pullman-Standard plans and research for the future provide an opportunity to returning soldiers for postwar employment. So that when materials are available these men may resume their familiar tasks of building *safe, comfortable, dependable* railroad equipment—even finer than they built before they left our shops and machines to wage freedom's war.

BUY MORE THAN BEFORE IN THE 5th WAR LOAN

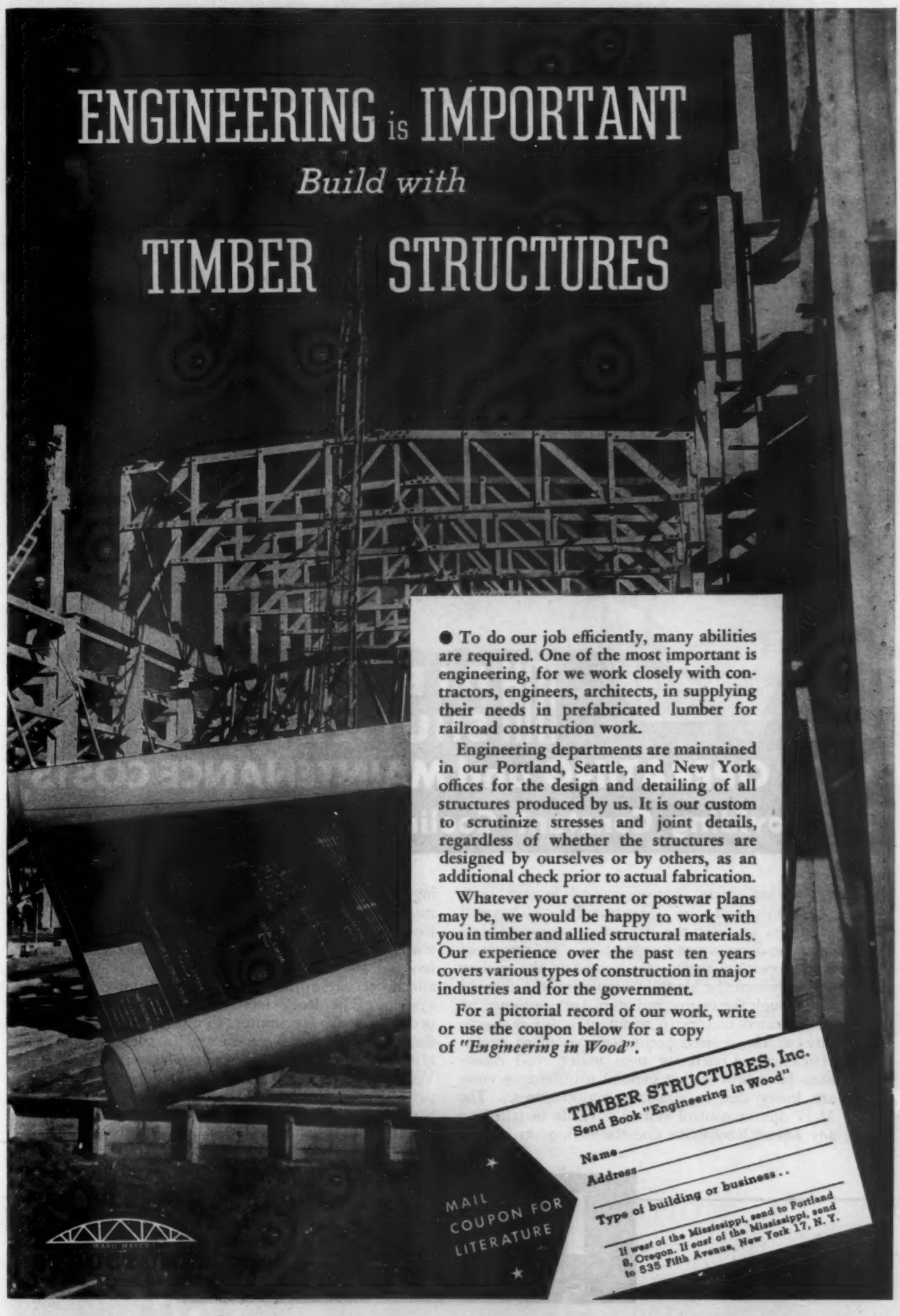
In addition to passenger cars, Pullman-Standard designs and manufactures freight cars of all types, subway, elevated and street cars, trackless trolleys, car wheels and other railroad equipment.

Offices in seven cities . . . . Manufacturing plants in six cities

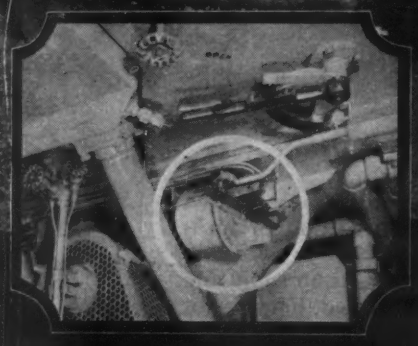
This Advertisement is appearing currently in some of the national magazines

Pullman-Standard
CAR MANUFACTURING COMPANY
CHICAGO • ILLINOIS
World's largest builders of modern streamlined railroad cars

© 1944, P.S.C.M. Co.


ENGINEERING is IMPORTANT
Build with
TIMBER STRUCTURES
● To do our job efficiently, many abilities are required. One of the most important is engineering, for we work closely with contractors, engineers, architects, in supplying their needs in prefabricated lumber for railroad construction work.
Engineering departments are maintained in our Portland, Seattle, and New York offices for the design and detailing of all structures produced by us. It is our custom to scrutinize stresses and joint details, regardless of whether the structures are designed by ourselves or by others, as an additional check prior to actual fabrication.
Whatever your current or postwar plans may be, we would be happy to work with you in timber and allied structural materials. Our experience over the past ten years covers various types of construction in major industries and for the government.
For a pictorial record of our work, write or use the coupon below for a copy of "Engineering in Wood".
MAIL COUPON FOR LITERATURE
TIMBER STRUCTURES, Inc.
Send Book "Engineering in Wood"
Name
Address
Type of building or business . .
If west of the Mississippi, send to Portland 8, Oregon. If east of the Mississippi, send to 535 Fifth Avenue, New York 17, N. Y.

. . . The Rock Island's Rocky Mountain Rocket has Minneapolis-Honeywell Automatic Shutter Control Systems on its Diesel Engines



MH DIESEL ENGINE SHUTTER CONTROL

CUTS OPERATING and MAINTENANCE COSTS

by Providing Constant Cooling Water Temperatures

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OVER THE HUMP! America's miracles are no longer news—its record in this war is a succession of miracles. But there is one accomplished "impossibility" which deserves special mention: *The job our Railroads are doing!*

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Another Motorola Radio First

Motorola Two-Way Radiotelephone

Now Serving Rock Island Railroad Lines

Equipped with the Motorola FM two-way radiotelephone system for railways, Rock Island Radio Station No. 1 began service on June 5, 1944. This event makes the Rock Island Lines the first railroad with its own radio station and the first railroad to which a Federal permit and license to operate a radio station has been issued directly by the United States Government.

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Upper photo shows engineer and fireman in Diesel locomotive moving down the tracks while engineer listens to yardmaster some twenty-five miles away. Lower photo shows engineer replying to yardmaster, with fireman an interested listener.

For full details write the Motorola Division

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The body center of gravity is lower and the point of body support higher than in the old style cars, thus permitting these newly designed coaches to ride bumps and curves without road shock or end thrust. One of these revolutionary, newly designed cars is in service on each of three western railroads.

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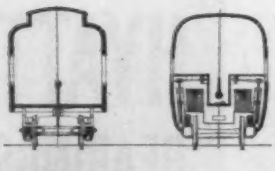
This sectional view of the internal body construction of this new car details the original and unique design which combines the maximum of sturdy strength with light weight.



Left—Old-style car, with high gravity center and low rotation center, sways and bumps on rough roadbeds.

Right—The new coach, with low center of gravity and high center of rotation, is "jounceless".

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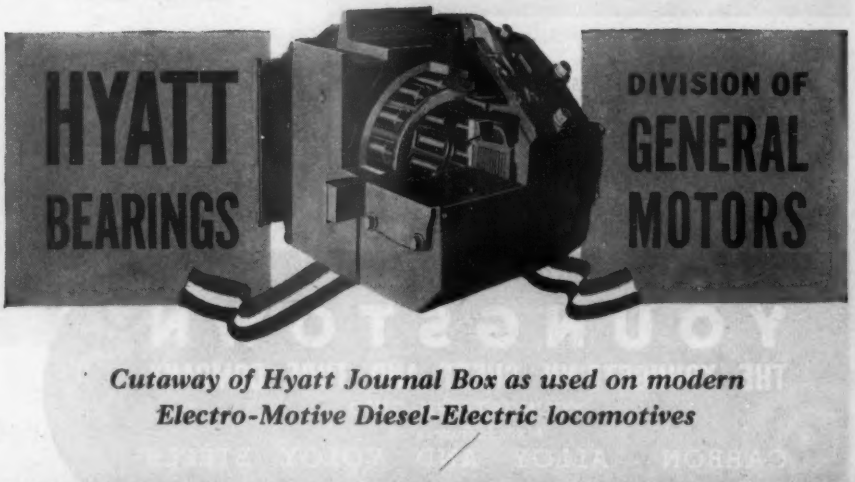

Cutaway of Hyatt Journal Box as used on modern Electro-Motive Diesel-Electric locomotives

HYATT BEARINGS DIVISION · GENERAL MOTORS CORPORATION · HARRISON, NEW JERSEY

Railway Age

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D. & S. L. Renews Tunnel Rail ***108***

After careful study of corrosion conditions peculiar to the 6.21-mile long Moffat tunnel, a special rail section was chosen and a new type of full-fusion Thermit weld developed—all welds were radiographed for soundness, with special measures being taken to protect workmen from radium rays.

Modern Rolling Stock Materials ***112***

A review, by Stephen H. Badget,t (mechanical engineer, Pressed Steel Car Company) of the type of passenger car construction that has resulted in the development of the modern de luxe coach and of the materials available for the future.

Finds Railroads Heavily Taxed ***118***

B. I. R. staff report shows that 1940 levy hit them, the pipe lines, and buses harder than trucks, air lines, and water carriers; Childe indicates disposition to oppose user taxes, interest charges, etc., on publicly-financed facilities.

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The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

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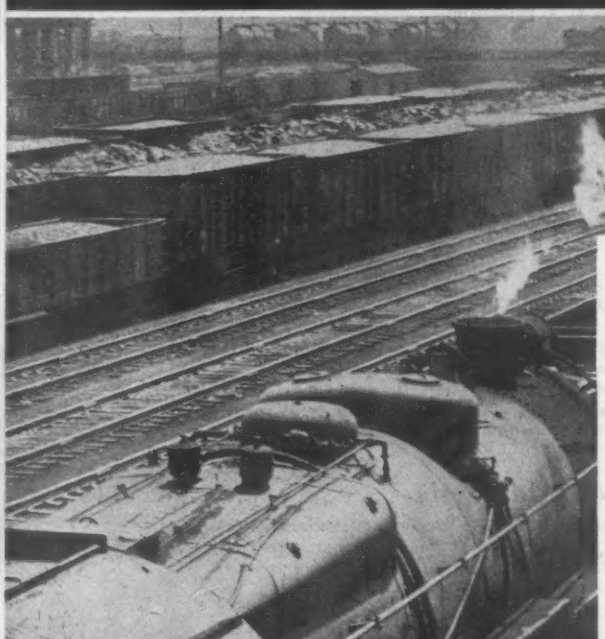

REGARDLESS of time of day or adverse weather conditions, freight yards must be kept free of congestion to assure prompt deliveries of vital war materials. An effective way to reduce delays and keep the traffic moving smoothly through heavily burdened yards at all times is to install "Union" Yard Communication.

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The Week at a Glance

M. R. S. IN NORMANDY: The readiness of the Military Railway Service to move into Normandy to take over the job of reconstructing the railroads in the occupied area and to prepare for the movement of troops and supplies into recovered territory has been so much taken for granted, apparently, that relatively little attention has been paid, so far, in reports from the front or in editorial comment to the vital importance of its task and the quiet effectiveness with which it goes about its business. Details of the officer personnel of the first M. R. S. battalion to be shifted into Normandy appear in this week's news pages, together with a brief outline of the intensive program of preparation and training in England that preceded their transfer across the Channel. As noted in another news item, the chief of transportation in the European theater, Frank S. Ross, has recently been promoted to the rank of Major General. Still another item discloses some of the achievements of the senior procurement and stores officer in the M. R. S. invasion forces, Col. Sidney L. Bingham.

●

WHAT ARE RIVERS FOR?: There are evidently some uses for water in rivers other than that of floating barges. The United States Chamber of Commerce hints at this possibility but, taking a firm seat in the space intervening between two stools, it wouldn't be just too positive. Willingness to compromise is doubtless an admirable trait of character—but there have been instances of carrying it to unprofitable lengths, as the late Neville Chamberlain could doubtless have testified.

●

WAYS TO SAVE WEIGHT: While some variations in alloys may be expected to appear on the postwar market, it is doubtful if any radically different materials or combinations of materials suitable for passenger car construction will be offered very soon—so thinks Pressed Steel Car's Stephen H. Badgett, whose discussion of modern rolling stock materials (based on a presentation at the recent A. S. M. E. meeting at Pittsburgh) begins on page 112 in this issue. Controlling characteristics of the metals already available, particularly those of the aluminum group, are assessed in illuminating detail, and weight-saving accomplishments in structural design are emphasized. The inclination to add weight in the form of refinements and specialties may, he suggests, call for a bit more attention to weight reduction in that field.

●

STRANGE BEDFELLOWS: The inconsistency of the position taken by those self-proclaimed doughty defenders of the rights of states against an all-powerful centralized government—the U. S. Chamber of Commerce and its constituent associations—in getting worked up over the "trade barrier" grievances of the organized long-haul commercial truckers is discussed in this week's leading editorial. Here these unflagging (more or less) crusaders in the cause of private enterprise are exposed marching docilely in line under the banners of those who would use government-built, government-owned and government-maintained facilities to take business away from their private-enterprise competitors, the railroads. In so yielding to this minority "pressure group," it is shown, scant attention has been paid to the deserts of the much more numerous, but relatively unorganized, *incidental* users of the public roads—the citizen on his neighborhood errands, the farmer trucking his produce, the merchant delivering his wares—but all effort is focused on attaining the desires of those numerically insignificant but outspoken and unrelenting groups that would like to see removed practically all legal limitations on their exploitation of public facilities for their private gain.

●

PULLMAN YIELDS TO COURT: Pullman, Inc., has decided not to take chances on appealing the court decision under which it is ordered to divest itself either of its manufacturing interests or of its sleeping-car business. Under the decision as it stands, the company may choose which branch of its activity to forego—whereas, a decision on appeal, if unsuccessful, might also deprive it of the right of election of which to relinquish. Details are given in the news pages herein.

●

HOW MANY CARS?: An editorial in this issue raises the question of how many new freight cars the railroads are likely to get from the builders during the current year. Since all the railroads' success in moving the war load has had its origin in getting advance knowledge of what the load was going to be and the facilities available to accommodate it—some dependable advance information on what freight car acquisitions are going to be would be welcome, even if the news is bad. At the beginning of the year the O. D. T. estimated that 70,000 cars could be produced this year—and, at about this same time, the W. P. B. set the production goal at 50,000. However, in the first six months, less than 18,000 cars were turned out, and 48,000 were on order. If the railroads don't get the cars they need, it won't be (as the O. D. T. at one time suggested) because they haven't placed orders in sufficient quantity.

●

RESEARCH SANS GLAMOUR: Another example of the way in which railroads long have quietly been carrying on research to solve their peculiar problems—frequently in fields far removed from the notice of many vociferous critics of their policies and attitudes toward technological progress, but none the less important on that account—is the subject of an article on page 108. Here are described the rather extraordinary corrosive conditions prevailing in the Moffat tunnel, the full-fusion Thermit welding process developed for the special continuous rail installation to meet these conditions, and the original techniques employed in the radium-produced gamma-ray photographic examination of each weld in the project.

MORE MANPOWER: Employment on the railroads has picked up another 1.52 per cent in the most recent 30-day period for which figures are available, and is 4.6 per cent above June, 1943, according to the latest I. C. C. summary. While some comfort may be taken from these quantitative improvements in the manpower situation, more detailed figures within the commission's tabulations indicate, nevertheless, that the particularly critical needs for *skilled* workers in important categories—train and engine service, for example—are still increasing.

●

REPORT ON TAXES: Much condign criticism has come the way of the Transportation Board of Investigation and Research—for doing things it ought not to have done and leaving undone things it ought to have done. This criticism, however, does not apply to a substantial part of the staff of the board. In marked contrast to the remaining board members, several of the staff have given ample evidence of scholarly competence and sense of responsibility. Some of their reports, here and there, are attaining publication despite the seeming lack of enthusiasm of board members that any positive and constructive results from the time and money spent in these investigations should come to fruition. One such report—a competent and comprehensive one—on the comparative taxation of the various agencies of transportation—has managed to attain the light of day, and is reviewed in an article in this issue. Board Member Childe in an appended statement, as might be expected, barks and snaps at the objective scholarship of the report for its failure to yield to his well-known prejudices.

●

RAILROADS OVERTAXED: The B. I. R. staff report on taxation finds that, compared to most other agencies of transportation, the railroads are heavily overtaxed—a condition which seriously threatens the public interest in continued efficient railroad transportation. The source of this uneconomic burden on the railroads is found to lie in the "failure of both federal and state governments to levy user charges upon the truck lines, air lines and water carriers sufficient to cover a fair share of highway, airway, waterway . . . costs plus a reasonable tax equivalent" on the value of public property devoted to such forms of transportation. Those familiar with Board Member Childe's career as an advocate in opposition to the elementary economic principles upon which such findings are based—before he was thrust up to the seat of judgment in his own cause—can well imagine his vexation with such scholarly conclusions.

●

RAILROAD PURCHASES: In the first quarter of the current year, the railroads spent $415 millions for fuel, materials and supplies—which was 30 per cent more than their outlays for this purpose in the parallel 1943 period. Excluding fuel, the dollar value of the first quarter's purchases was up 38 per cent. Detailed statistics are given in a short article in this issue.

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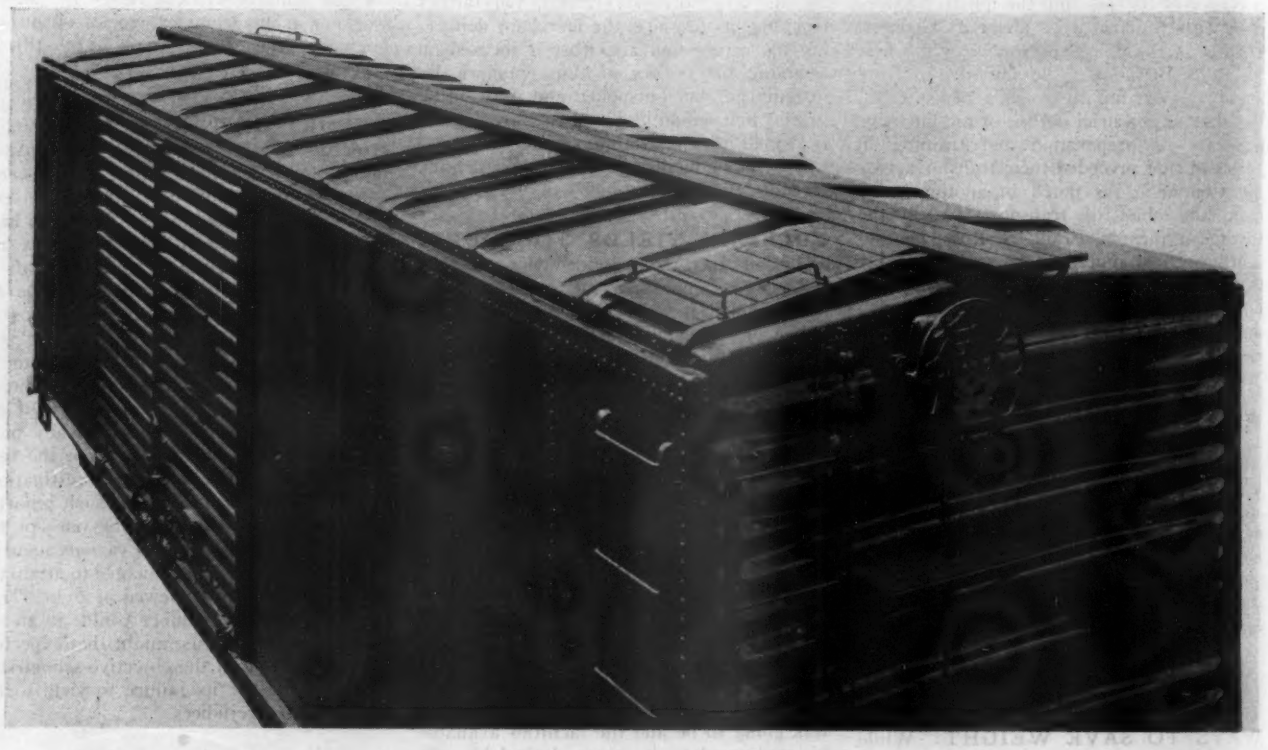

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RAILWAY AGE

How "Pressure Groups" Control Highway Policy

The Chamber of Commerce of the United States announces that in a poll of its constituent local associations, 1,735 voted in favor and 389 against a recommendation that the federal government oust the states from control of maximum permissible sizes and weights of motor vehicles. There can be no doubt that the national chamber and its affiliated organizations have been influenced to take this action by the clever and persistent barrage of misleading "trade barrier" propaganda which advocates of bigger and bigger trucks have been issuing for years.

The states own the highways. There has been federal aid in their construction, but it has been small compared with the billions the states have spent. On other questions most business men inveigh against centralization of power in the federal government. Their acceptance of the contention that the federal government should nullify regulations adopted by the states to prevent abuse of highways they have built mainly with their own money, shows how poorly the public interest is defended from the onslaught of unopposed "pressure groups."

Efficiency FOR VICTORY

The proportion of highway use represented by those who operate, or would like to operate, big trucks that are especially destructive to the roads is a small fraction of total highway traffic. The operation of these mammoth vehicles is a nuisance, a danger, and an expense to all other users of the highways. Most people who use the highways do so *incidentally*—their main interests lie elsewhere. Private motorists are on the rural highways at most only a fraction of the day; motoring is not the occupation from which they gain their livelihood. The same is true of farmers using trucks, and of operators making local deliveries with trucks, whose vehicles are, as a rule, small and whose main concern is with city streets. However strongly such predominant users of the highways may be opposed to their use by oversized vehicles, they are not going to take much time out from their work or spend much of their money to give political effect to their opinions.

The case is entirely different with the minority of highway users who operate heavy-duty trucks for profit. They are on the highways all the time, because use of the highways is their business; and because it is their business, they have every incentive to spend time and money in employing advertising agencies, writers, lawyers, and lobbyists to secure, through politics, maximum freedom and minimum charges for their use of the highways.

The automotive, road-building and kindred interests as a whole, although their well-being stems mainly from other highway users, tend to look upon the self-seeking activities of long-haul commercial truckers with favor. They know that passenger automobiles and light trucks will use the highways, anyway, and, therefore, back the operators of heavy trucks in their efforts to secure, through political favoritism, opportunity to take from the railways traffic which, without such favoritism, would not move by highway. Thus, there is no organized effort to defend the interests of the great bulk of highway users where these conflict with those of long-haul truckers.

Apologists for "pressure group" politics contend that it is not

inimical to the public interest, because opposing "pressures" offset each other.

This is not true, because not every interest in the community has a competent and well-financed pressure group to defend it. Where is the pressure group which today is defending the public interest against the pressure groups that are promoting the commercial exploitation of publicly-owned transportation facilities—highways, waterways and airports?

The vote of the constituent associations of the U. S. Chamber shows, as has so often been emphasized, that business men are wholly inconsistent in their attitude toward private enterprise, for only the railroads provide transportation with facilities that are entirely privately-owned; and the real purpose of the policy for which the chamber's members have voted is to help truckers using government-owned highways take traffic from the privately-owned railways.

Motor Car Essential for Maintenance Forces

For years the hand car and the work train represented the only means at the disposal of the maintenance officer for transporting men; and the work train was the sole means for distributing material, except where the local freight could be obtained for an hour or two. If the men were to be moved for a considerable distance, the hand car required too much effort and the time involved represented a loss of productive time. On the other hand, the work train was expensive and, unless other work could be provided, the cost for transporting the gang was excessive.

Although these facts were recognized, no constructive effort was made to overcome the condition until the appearance of the automobile stimulated the development of the internal-combustion engine. As practically all of the early engines of this type were designed for the propulsion of vehicles, it was natural that the first railway application was to the hand car, at which time the forerunner of the modern track motor car was born. However, it required some time to build complete dependability into the motor car, but when this was done, it became accepted widely and bears the distinction of being the first and only type of power equipment to come into universal use as an aid to railway maintenance.

While designed primarily for transportation of men and their equipment of small tools, many other important uses have been found for the motor car, and special designs for special classes of service have been developed. To say that it is supreme in its own field, so far as track, bridge, signal and telegraph and telephone maintenance are involved, is merely to state a fact that is known to every maintenance officer. In addition, many benefits have been derived from the use of motor cars that were not foreseen by their early proponents.

Motor cars have been used for many purposes, and in those applications that come logically within their own field they have proved to be dependable and economical. In these applications they save the maintenance forces much time and effort that is thus made available for productive work, but which would otherwise be wasted in the form of unproductive labor. Like many other machines, however, their use should be confined to certain well-defined lines of work, outside of which they may be neither desirable nor economical.

Motor cars have simplified the problems of track and bridge inspection; they facilitate the maintenance of signals; and they have saved untold hours in the restoration of communications when telegraph and telephone lines have been interrupted. Men now arrive fresh and energetic at the site of the work, instead of being fatigued before they start their assignment. As one result of their use many thousands of work-train-days have been eliminated, representing a saving more than sufficient to offset the original cost of the motor cars themselves.

Even as the automobile pointed the way for the motor car, the latter prepared the foundation and pointed the way for the wide variety of power machines and tools that are in use today in railway construction and maintenance. The motor car not only demonstrated the practicability of the internal-combustion engine, but it demonstrated as clearly its advantages over the steam engine for power machines that must be highly responsive and quick in action and that must possess the maximum of flexibility and mobility.

Buying and Stocking Diesel Locomotive Parts

Among the fourteen timely reports of the Purchases and Stores division, A. A. R., that were published in the July 1 *Railway Age*, the brief report of the committee on subject 42, "Diesel Engine Parts—Purchasing and Storekeeping," contained many interesting observations, although it made no definite recommendations with respect to material for inclusion in the division's Manual. In outlining the general principles of the subject, the committee is of the opinion that the same general methods should be applied to ordering and caring for parts and materials for Diesel locomotives as have been developed for materials for other types of motive power.

The report goes on to point out the advantages that are to be gained by utilizing the warehouse stocks of

the manufacturers of Diesel locomotives. These are carried at convenient locations throughout the country and are designed to relieve the railways from the necessity of maintaining large stocks and securing materials and parts from the main plants.

It is rather significant that the report does not elaborate to any extent upon this feature. For instance, it does not attempt to set up lists of the parts that it would be desirable to secure from the manufacturers' district warehouses. Is it a matter that could be worked out between representatives of the Mechanical and Purchases and Stores divisions, possibly in conjunction with manufacturers' representatives?

Unquestionably, the operation of Diesel locomotives presents new and varied problems for purchasing and stores officers in conjunction with the procurement of many items of protective materials and parts. The committee has found that the call for these items can be determined only with the experience of a prolonged period of operation.

Again, it points out the need for careful observation and checking so that none of the material will become obsolete while on the storehouse shelves. In this connection, the report states that developments in the operation of Diesel locomotives have sometimes necessitated changes in design that have rendered some parts obsolete almost overnight.

Another pertinent and important suggestion put forward by the committee is the establishment on individual railways of permanent committees for considering problems relating to the procurement of materials for Diesel locomotives. With periodical meetings of such groups, composed of technicians of the several departments involved, many of the problems of ordering, handling, using and accounting for Diesel materials could be settled on the spot. Such meetings would also aid in disseminating information contained in manufacturers' service bulletins and facilitate the return of surplus materials and parts to the manufacturers for repairs.

How Many New Freight Cars in 1944?

In December, 1943, representatives of the Office of Defense Transportation appeared before a special Senate committee which was looking into the freight-car supply picture of the country and, among other testimony, stated that it was believed that the freight-car building capacity of the country in 1944 would be about 70,000 cars for domestic service. In the same month the War Production Board announced as its goal the construction of 50,000 freight cars for the domestic market. During the first six months of the year only 17,183 cars have been released from railroad and private car-building shops; allowing for some increase in production during the latter half of the year a total of about 40,000 cars might go into service by the end of December.

Since the first of the year there have been a number of occasions on which representatives of the O. D. T. and W. P. B. have chosen to be critical of the railroads for their alleged failure to order equipment to the limit of the materials which were being allocated for car construction. These criticisms acquire new interest in the face of the fact that deliveries have been 17,183 and cars on order as of July 1 total 47,821. This total of installed units and those on order exceeds the goal set by the W. P. B. by 15,004 cars and almost equals the O. D. T. estimate of total available capacity.

At a meeting of a new committee—the Railroad Car Builders' Industry Advisory Committee—on May 25, the members who represent both railroads and builders were informed by a W. P. B. representative that the "lead time" between approval of material schedules and actual delivery of cars would have to be increased from four to seven months because of difficulties in obtaining component parts of the cars. This matter of obtaining material is one in which the O. D. T. as a claimant agency and the W. P. B. as the agency allocating materials hold control. It is to be hoped that, albeit war conditions make the extension in "lead time" necessary, the railroads will not later be blamed if car shortages develop when the rules were changed after the time when sufficient orders were on hand to take up the estimated 1944 production. Actually, deliveries and orders on the books as of May 1 were sufficient to have met the W. P. B. estimate of 50,000 cars production.

With fewer than 18,000 cars delivered in the first six months of the year it is hard to see any prospect for meeting or coming close to the W. P. B. figure for 1944 unless building programs are considerably accelerated. Just what the W. P. B. expects in the way of deliveries is certainly not clear from its representative's statement on production. According to this spokesman, production in the year 1944 will be *the equivalent of* 85,500 freight cars including "compensated units."

These "compensated units" represent smaller cars built for the military services or lend-lease converted for statistical purposes to equivalent standard cars. Silence regarding the number of cars being built for export is probably necessary but it is not clear why the expected production of domestic cars must be hidden in any such bookkeeping figures. As it is now, no one knows how many cars will be received to aid in carrying the freight load of the railroads; the W.P.B., which should know, is not helpful, and we are left to guess.

As a guess, 40,000 cars for 1944 seems to be a sufficiently optimistic estimate. It would be encouraging, however, to hear from those in authority that more will be received. In fact, it would be encouraging to get a dependable figure even if it should be less than the estimate given here.

D. & S. L. Renews Tunnel Rail

Pouring a Mold for a Closure Weld in the Tunnel

Develops new full-fusion Thermit welds, use of a special rail section to offset corrosion and radiographs to check soundness of all welds

IN 1943, 66,000 ft. of continuous welded 130-lb. rail was laid in the Moffat tunnel of the Denver & Salt Lake. Because of the severity of corrosion in this tunnel, a special rail section was selected for the relay and a new type of Thermit weld was developed, known as the full-fusion weld. Additional features of interest are the background of research on corrosion problems in the tunnel, the use of radium to take gamma-ray photographs of each weld to check its soundness and the problem of doing the work without interfering with the heavy volume of wartime traffic. This work was begun late in the fall of 1942, later discontinued in January, 1943, because of winter weather, resumed in the spring, and completed in August, 1943.

Tunnel Conditions

Before discussing the relay of rail in the Moffat tunnel, it is necessary to have a general picture of the tunnel and an understanding of the unusually severe corrosive conditions which exist therein. This tunnel is a single-track bore, 6.21 miles long, located about 50 miles northwest of Denver, Colo., which passes under the Continental Divide with a maximum overburden of 2,600 ft. It is 33,798 ft. long, of which various sections totaling 18,432 ft. are concrete lined and the remainder is gunite lined. It was completed early in 1928 and opened to D. & S. L. traffic on February 26 of that year. Two years later, after completion of the Dotsero cut-off, the Denver & Rio Grande Western also began operation through the tunnel. The tunnel and the cut-off are a part of a main transcontinental route west of Denver and as such are subjected to heavy wartime traffic.

Approaching the tunnel from the east is a 2.0 per cent ascending grade about 25 miles long. The track has an elevation of 9,197.46 ft. above sea level at the east portal, and then ascends within the tunnel on a 0.3 per cent grade for 2.64 miles to the apex, at which point the elevation is 9,238.88. It then descends to the west on an 0.8 per cent grade for 2.43 miles and on a 0.9 per cent grade for 1.13 miles to the west portal, elevation 9,084.18, beyond which a 2 per cent grade descends for approximately 9 miles.

Helper engines are used on both eastbound and westbound trains, those westbound being cut off at the east portal and those eastbound being cut off at the apex of the tunnel. Because of this, corrosion is more severe in the western portion of the tunnel.

The tunnel is equipped with a ventilating system, consisting of electrically-driven fans located in a fan house at the east portal and an electrically-operated curtain at the east end. Originally the fans had a combined capacity of about 300,000 cu. ft. of air per minute, creating a breeze of 8 to 9 m.p.h. through the tunnel and they were formerly operated to blow against train operation by using dampers to suck air out of the tunnel or to blow fresh air into the tunnel at the east end. Because of the frequency of train movements, however, the tunnel was seldom cleared entirely of smoke before the next train approached, with the result that a plug of smoke in the center of the tunnel might be moved back and forth for several hours until a long period between train movements would permit all the smoke and gases to be exhausted by the ventilating fans.

In addition to the locomotive smoke, a large amount of cinders are deposited on the track. With the present volume of traffic, approximately three inches of cinders are deposited annually between the west portal and the apex, while east of the apex, only about one-half as much cinders are deposited. The humidity in the central four-mile section of the tunnel is always 100 per cent, a moist condition which greatly accelerates corrosion, while the temperature in the central portion remains nearly constant the year-around, ranging from 53 to 57 deg.

There are two signal circuits in the tunnel; one for a signal ½-mile from the east end which raises the curtain at that end, if the operator has not already done so; and another near the west end for trains within the tunnel approaching the west entrance, to give a reduced speed indication because of a curve at the west end of the tunnel. The moist condition, caused by the humidity, and the accumulation of cinders make the maintenance of these signals very difficult. Signal failures are frequent and the

Close-Up of Some of the Thermit Welding Equipment Employed on the Job

signal department has considerable trouble in balancing relays.

Since 1938 the D. & R. G. W. and the D. & S. L. have conducted extensive investigations of the corrosion in the Moffat Tunnel. The problem was complicated by the fact that the most rapid loss of metal was from corrosion-abrasion on the running surface of the rail. The secondary problem was to find a protective coating for the web and base of rail, tie plates and other fastenings.

Many Tests Disappointing

The investigation included the use of various protective coatings of a non-metallic nature, such as rust-preventative compounds, oils, oils plus hydrated lime, corrosion-resistant alloys and metal sprayed materials, for protection of the web, base and fastenings. For protection of the running surface of the rail against corrosion-abrasion, many of the tests were disappointing in that the results were either negligible, or other factors such as cost or offsetting disadvantages made effective protection impracticable. For example, the use of lime to neutralize the locomotive stack exhaust showed that corrosion was not reduced to any appreciable extent and resulted in a slippery deposit on the running surface of the rail.

The tests of various corrosion-resistant alloys available revealed that the 18 per cent chromium and 8 per cent nickel stainless steel would withstand the corrosion of the tunnel gases, while the other alloys corroded to varying degrees. The use of the 18-8 type as rail steel would not solve the problem of corrosion-abrasion of the running surface, since the protection afforded by these alloys comes from the formation of a minute barrier oxide film. Under the wheels of traffic, this film would be constantly ground off, thus not permitting protection. For the protection of the running surface, cathodic protection was studied, and while from 17 per cent to 33 per cent less corrosion was secured by this method, it required a constant spray of water on the rail and drain wires every few feet. Similarly, the use of sprayed metals was shown ineffective over long periods of time.

The principal problem was to secure greater life from the rail, particularly the head, and the studies of corrosion indicated that no practicable means is available for protecting effectively the running surface of the head which, under present traffic, is corroding and wearing off at an annual rate of slightly more than ⅛-in. in the west end of the tunnel and nearly ⅛-in. in the east end.

Some relief has been achieved, however, by installing larger fans and using a different system of ventilation. The new fans have a combined capacity of about 420,000 cu. ft. of air per minute and create a breeze of about 13 m.p.h. through the tunnel. The fans are used now to blow westward only, in spite of the fact that the tunnel has a natural draft of 3 to 3½ m.p.h. from west to east, and blowing westward involves a waste of power. The advantage of this system is that fresh air always passes through the fans and housings, eliminating corrosion of these units.

Special Rail Section Chosen

With this system of ventilation, the temperature and humidity are changed within the tunnel up to a point about ½ mile from the west end, varying in a straight-line proportion from the outside temperature and humidity to the regular tunnel temperature of 53-57 deg. and a humidity of 100 per cent at a point about ½ mile from the west portal. The outside temperature in the vicinity of the tunnel varies during the year from about —45 deg. F. to 80 deg. F. In winter, the cold air blown into the tunnel from the east end cools off the east half of the tunnel and when the fan is not operating, the natural draft from west to east through the warm and then the cold portion causes fog and snow in the east and considerable ice forms. In spite of the disadvantages mentioned, however, the new ventilation has fairly completely dried up the east end of the tunnel and has improved conditions at the west end. This improvement has been especially noticeable in the maintenance of signals in the tunnel.

Lining Two of the 1,000-Ft. Strings Over onto Skids, Preparatory to Pulling Them into the Tunnel

The study of corrosion problems in the Moffat Tunnel led to the conclusion that the most practical method of increasing the service life of the rail in the tunnel would be to use a special rail section with a higher and thicker head, and to apply to the web and base of rail and fastenings, the two most effective corrosion-resistant coatings developed during the tests. Since ½-in. is the limit of wear permitted for 112-lb. rail, a rail with ½-in. or more of additional metal on top of the head would have approximately double the service life of the standard 112-lb. rail.

Because of wartime restrictions, it was impracticable to develop a special design of rail for this relay. Accordingly, a section was selected from those for which rolls were available which had a deep head. The section selected, No. 1302, is a 130-lb. rail with the same base width and height as 112-lb. rail, but because it has a head 2⅛ in. high, it is estimated that this rail will have about

two years longer service life in the tunnel than 112-lb. rail.

In 1938, when the 112-lb. rail was laid in the tunnel, it was decided to eliminate the joints by installing continuous welded rail. Previous experience with the use of conventional joint bars and bolts had shown that due to stresses set up in the joints and at bolt holes in the rail, corrosion fatigue cracks developed rapidly, excessive batter occurred, and rail failures, particularly bolt hole breaks, were the result. Comparatively, experience with the continuous 112-lb. rail joined by the Thermit type K weld has been satisfactory. Only a few weld failures developed from a total of 1,052 welds until the last year of service, when the head of the rail, particularly in the west end of the tunnel, was worn approximately to the maximum limit allowable. At that time, failures of all kinds increased, including breaks through holes in the web and failures elsewhere in the rails.

Research with Type K Weld

The old Thermit type K weld is a combination fusion and pressure weld in which the base and web are cut back slightly and are joined by a fusion weld while the head of the rails is joined by a pressure weld. In this type of weld, the fins of metal which project out from the web of the rail and the holes in the web, which are used as pull-up holes for the pressure weld of the head, provided convenient places for the accumulation of cinders and for a concentration of corrosion. In addition, the fins and the gates which project from these fins had sharp re-entrant angles which caused increased stress at points which coincide with the point of greatest stress in the web. The holes in the web near the welds were also a source of weakness. Recent research by the Rio Grande on web failures in rails has indicated that a considerable amount of stress develops in the web because the wheel loading is not on the center of the head and that sharp re-entrant angles and bolt holes near points of maximum web stress are highly undesirable.

As soon as failures became frequent in the tunnel, all the welds and bolt holes were Magnafluxed. This revealed some sort of incipient crack in either the weld or one of the bolt holes in 75 per cent of the welded joints. Some of these cracks were not progressive, however, as evidenced by the fact that 600 ft. of welded 112-lb. rail outside the tunnel at the east end is still in service and no failures have developed in this rail. Nevertheless, it is believed that many such cracks were the initial start of failures, which might develop rapidly under the conditions of wear and corrosion existing in the tunnel.

At the same time, the Metal & Thermit Corporation made extensive tests of its type K weld in a rolling-load machine with the head of the rail beveled to develop stress in the web and obtain off-center loading similar to actual conditions in track. The results of these tests confirmed the Rio Grande research and led to the development of the full-fusion weld.

Full-Fusion Weld

The full-fusion weld, as its name implies, is entirely a fusion weld. No preliminary cutting or dressing of the rail ends and no pulling or draw-up is required. The rail ends are wire brushed to clean off rust and foreign matter and a clamp is used to hold the rail ends in alinement and 5/8 in. to 3/4 in. apart. Molds of a different design are applied and the rail ends are preheated to about 1800 deg. F. When they have been preheated properly, the Thermit is ignited and then poured from a crucible into the molds through two gates on top of the ball. The gating of the molds is designed so that the molten metal washes the face of the rail ends, actually melting a portion of the rail, and fills the space between. The theoretical temperature of the Thermit reaction is 5400 deg. F., but actually, because of some alloy content in the mixture and heat losses, the temperature in the molds is about 4000 deg. F.

The Thermit mixture for the full-fusion welds was also changed slightly by adding some manganese and nickel to produce a weld metal with a hardness approximating closely the hardness of the rail steel. Actual hardness tests of welds in the tunnel varied from 275 to 290 Brinell and the rail hardness runs from 225 to 260 Brinell.

The new weld does not have gates sticking out from the fins at each side and the fins themselves project out from the web a little less than those of the type K weld. In addition, the fins have a more rounded contour, avoiding sharp re-entrant angles as much as possible. These features, combined with the fact that the rail ends are not drilled, eliminate to a large degree the stress-raising features and weaknesses that were held responsible for the initial development of fatigue cracks—the first stage of many of the failures previously encountered.

All Welds Radiographed

The first field application of the full-fusion weld was made in the Moffat tunnel. Because this weld was new and also to insure, as nearly as possible, that all welds would be perfect, they were photographed with gamma rays to detect blow holes and cold-shot within the weld, using radium as the activating source. For this purpose, four 100-milligram and one 200-milligram capsules of radium were rented, by means of which five welded joints could be photographed at a time. These capsules are aluminum and contain the radium in powder form. The gamma rays from the radium capsules are of a quality equivalent to those from a one- or two-million volt x-ray machine.

To take the films, a clamp with attached film holders was placed on the rail at the weld, the radium capsule was hung on the clamp on one side of the joint and two films were placed, one in a vertical position on the opposite side of the head and the other in a horizontal position under the base. For the 100-milligram capsule, the films were exposed 45 min. through the head and 10 min. through the base. As a check on the radiograph pictures, artificial defects were taped on the head of the rail about 1/2-in. from the limits of the weld. These artificial defects consisted of three small cubes of metal varying from 1/4-in. to 1/16-in. in size, with small holes drilled through them. These were checked on each radiograph film to make sure that a good picture was obtained.

Special measures were taken to protect the workmen from the radium rays. Those working around the radium carried a film similar to a dental x-ray film and if they were exposed to too much radium, the film would darken. The films carried by the men were developed every two weeks and new films substituted. In addition, the men were given a blood test every month and the men carrying the radium carried the capsules on sticks five feet long with red flags tied on them. The workmen were instructed to stand 10 ft. away, for a man can work safely eight hours a day at that distance and still be subjected to less than a minimum exposure.

When the welding work was first started, the weld rejections were very high, but the methods of welding were soon perfected and the rejection rate was reduced to two per cent. One of the principal aids to the design of

the new weld and to improving the methods of application was a series of etch tests made on rejected and experimental joints, which showed that where a portion of the rail ends was actually melted or "washed" when the weld metal was poured, the weld was sound, otherwise not. To insure that this would take place, it was necessary to give the rail ends adequate preheating.

Welding Procedures

In general, the rails were welded into continuous strings 1,017 ft. long outside the tunnel near the east portal and the connection or closure welds between the strings were made in the track. A dock 1000 ft. long and 42 ft. wide, parallel to the main line and 8 ft. from it on the south side was constructed of 12-in. by 12-in. timbers. The height of the dock was 10 in. above the top of the main line rails. This dock accommodated a stock pile of unwelded rails and provided space for welding work and the storage of the welder strings.

In doing the welding work, four strings were welded at a time, beginning at the east end and progressing uphill, toward the tunnel. The joints were alined, rail clamps attached and the welds were made in multiples of four. The molds were made on the job, using wooden patterns. These were put in place and preheating was begun.

Portable Kerosene Burners

For preheating purposes, portable kerosene burners connected to an air-blower powered by a Briggs-Stratton gasoline motor were used. A hole was provided in the side of the mold for the entrance of the preheating flame which hole was plugged before pouring the weld. While the rail ends were being preheated, the top of the mold was covered with an iron plate to retain the heat. The original estimates of preheating time were 15 min., based on calculations and experimental work at elevations near sea level, but because of the high elevation and colder weather an average of one hour was required to bring the rail ends here to a cherry red color, or 1800 deg. F. This temperature was checked on every weld with an optical pyrometer.

While the rail ends were being preheated, the crucibles, which were swung to one side, were filled with the Thermit mixtures ready to be fired and when the preheating was completed, the preheating hole was plugged, the cope was placed on the top of the molds and the crucibles swung into place over the cope and ignited. Completion of the Thermit reaction requires about 30 sec., after which the crucibles were tapped by knocking out a pin in the bottom and the molds were poured.

When the welds had cooled, the mold boxes were removed, the gates were cut off with an oxy-acetylene cutting torch and the running surface of the rail was ground to proper contour with a heavy-duty gasoline-engine-driven carriage-mounted grinder having a flanged roller at each end. The sides of the welds on the rail heads were finished with a portable gasoline-engine-driven flexible shaft grinder, after which the radiographs were taken to check the soundness of the welds.

As the welding work progressed along each set of four 1017-ft. strings, they were lined over onto the finished side of the dock next to the main line, and another group of rails was lined over in preparation for the next series of welds.

The 1017-ft. strings normally consisted of 21 39-ft. and three 66-ft. lengths, requiring 23 welds to the rack. The rails were originally ordered in 66-ft. lengths, but the mill could not furnish them and a large number were received in various lengths between 39 ft. and 66 ft.

The welded rails were pulled into the tunnel in pairs by a Diesel switch engine with two flat cars. For this operation, ties were placed across and on top of the main line rails at approximately 40 ft. intervals and two of the new welded strings were lined over sidewise onto the ties.

The new rails were placed about three feet apart and spiked onto the sled ties. Rail anti-creepers were also placed on the new rail on each side of each sled tie. On the bottom of the sled ties, tie plates, cut in half, and spiked to the tie were used as sled shoes on the ball of the main line rails. At the end of the welded rails, modified gripper clamps were attached and a 1⅛-in. steel cable was extended from these to the drawbar of the rear flat car, using a special fitting for attachment to the drawbar. By this means, the rails were pulled into the tunnel at speeds as high as 25 m.p.h.

To unload the new rails, the spikes were pulled, the rails were jacked up, and the sled ties were pulled out, after which the new rails were let down to the track ties between the running rails in upright position. To save time with the switch engine in spotting the 1017-ft. lengths of new rail, they were lapped slightly and when installed, a short piece was cut off with an oxy-acetylene cutting torch to get the proper space for the closure weld. The skid ties were loaded on the two flat cars behind the Diesel locomotive and were returned to the welding dock.

Pulling in the rail was a problem, particularly at the west end which was relaid first, because of the volume of wartime traffic. In this part of the work, only two strings a day could be hauled in, because of the longer distance involved, and frequently the gang had to wait several hours before a sufficient interval occurred between trains. At first, the crew was limited to a maximum of two-hour blocks for this work. In the latter stages of the work in the east end, the time permitted was cut to 45 min. and because of the shorter distance involved, as many as four pairs of the long rails were hauled in per day.

Laying the Rail

In the relay operation, four strings 1017 ft. long were usually laid at a time. The rail was laid on new double-shoulder 8⅛-in. by 11½-in. 112-lb. tie plates with new spikes. The tie plates and spikes were dipped in a suitable grease or rust-preventative compound before application. Five types of such protective coatings are under test in the tunnel. The rail was coated on the welding dock, except at the ends before being pulled into the tunnel. The ends were coated after the closure welds were made.

Two Nordberg spike-pulling machines were used to pull old spikes and the old rail was lined over on the outside ends of the ties. The old tie plates were removed and new tie plates placed, after which the new rail was lined in place and spiked. No adzing was required, since the old and new tie plates were the same size, and the spiking was done by hand. The ends of the new rail were held in alinement by fish plates secured by clamps and wedges until the following day when the closure welds were made.

The closure welds were made in the track and radiographed in a manner similar to that already described. It was decided not to reject any closure welds, however, unless the photographs showed actual evidence of lack of fusion and none were rejected, although a few photo-

(*Continued on page 123*)

Modern Rolling Stock Materials

A discussion of the type of passenger-car construction that has resulted in the development of the modern de luxe coach and the materials available for the future

By Stephen H. Badgett

Mechanical Engineer, Pressed Steel Car Company

ONE of the earliest so-called "steel" coaches was built by the Pressed Steel Car Company and delivered to the Southern in 1906. Considerable wood was used throughout; both the body and trucks being of a composite construction. The coach was about 74½ ft. long, weighing 110,100 lb. and seating 73 passengers. The specialties were rather few; consisting in part of plain air brake, high-pressure steam heat, Pintsch gas lights, walk-over seats, and so on.

The all-steel coach of the late '20's, common before the advent of the streamliner, was constructed of relatively heavy mild steel sections and the general interior finish was also fabricated of steel. The clerestory type of roof was yet in vogue and the fish-belly center sill in combination with a steel platform and bolster casting was still common though being somewhat displaced.

A typical coach of this era was about 79 ft. long, weighing 130,500 lb., and seating 84 passengers. The specialties had both been improved and increased in number; now including an air brake with a universal valve, batteries, a belt-driven 2-kw. generator, and an improved coupler, to mention several.

The railroads were becoming alarmed at the increase in total train weight with no revenue increase. Stronger and lighter materials of construction were offered, the modern streamlined coach was developed, and the A. A. R. later evolved a specification setting forth a standard for safety and strength in passenger car design. Just previous to this war, a typical deluxe streamlined coach of riveted and welded low-alloy steel construction was about 85 ft. long, weighing 121,000 lb. and seating 56 passengers.

Table I—General Trend in Steel Coach Weight

	1906 Coach	Late twenties coach	Modern deluxe coach
Weight of complete car, lb.	110,100	130,500	121,000
Weight of two trucks, lb.	36,500	33,600	39,000
Weight of complete body, lb.	73,600	96,900	82,000
Weight of body specialties, lb.	11,000	40,300	48,500
Weight of body without specialties, lb.	62,600	56,600	33,500
Body specialties in percentage of complete body, per cent	15	42	59
Length of car, ft.	74½	79	85
Number of passengers	73	84	56

The specialty items had been further improved and increased in number; electro-pneumatic control devices having been added to the air brake, modern lighting and air conditioning requiring larger capacity batteries and 20 kw. generators, improved seating, air-pressure water system, and others. Streamlining required a skirting and a full end closure. The brake cylinders, roller bearings, and various ride-cushioning devices had been added to the trucks.

Table I compares the steel coach weights of the three eras and further subdivides them into components in order to illustrate the individual trends. The following discussion refers to this table.

Low-alloy steel construction combined with an aluminum interior brought an abrupt decline in the weight of the complete car. Other structural materials or a welded assembly will result in a further reduction. The weight of two trucks shows some increase due to the advent of roller bearings, ride-cushioning devices, and the attachment of brake cylinders to the trucks. The weight of complete body shows a decline from the late twenties, but a breakdown indicates the trends of the body specialties and the remaining body structure combined with the finish. The weight of body specialties has increased to over four times that of the 1906 coach and the trend shown is definitely upward. The trend of weight of body without specialties indicates the results of development and design efforts towards a reduction in weight. The riveted and welded deluxe coach chosen follows reasonably the forerunning type of construction and thus emphasizes the fine results accomplished by the combination of a low-alloy-steel structure with aluminum finish. With a 10½ ft. increase in car length, this weight is about one half that of the 1906 coach. The percentage figures also serve to show the specialty trend; the rise to 59 per cent being emphasized by the reduction in body weight.

Table II—Trend in Coach Body and Specialty Weights, Per Foot of Length

	1906 Coach	Late twenties coach	Modern deluxe coach
Length over-all, ft.	74½	79	85
Weight of complete car, lb.	1,480	1,655	1,425
Weight of complete body, lb.	985	1,225	965
Weight of body specialties, lb.	145	510	570
Weight of body without specialties, lb.	840	715	395

Table II reduces the weights to the common base of pounds per foot of length. The same trends are indicated throughout. Notice in comparison to Table I that the per-foot weights of the complete car and of the complete body for the deluxe coach are both less than for either of the other two coaches.

Table III—Trend in Coach Weight Per Passenger

	1906 Coach	Late twenties coach	Modern deluxe coach	
Number of passengers	73	84	56	84 (assumed)
Weight of complete car, lb.	1,510	1,555	2,160	1,440
Weight of complete body, lb.	1,010	1,155	1,465	975
Weight of body specialties, lb.	150	480	865	575
Weight of body without specialties, lb.	860	675	600	400

NOTE—This is an abstract of a paper presented at the semi-annual meeting of the American Society of Mechanical Engineers, Railroad Division, Pittsburgh, Pa., June 20, 1944.

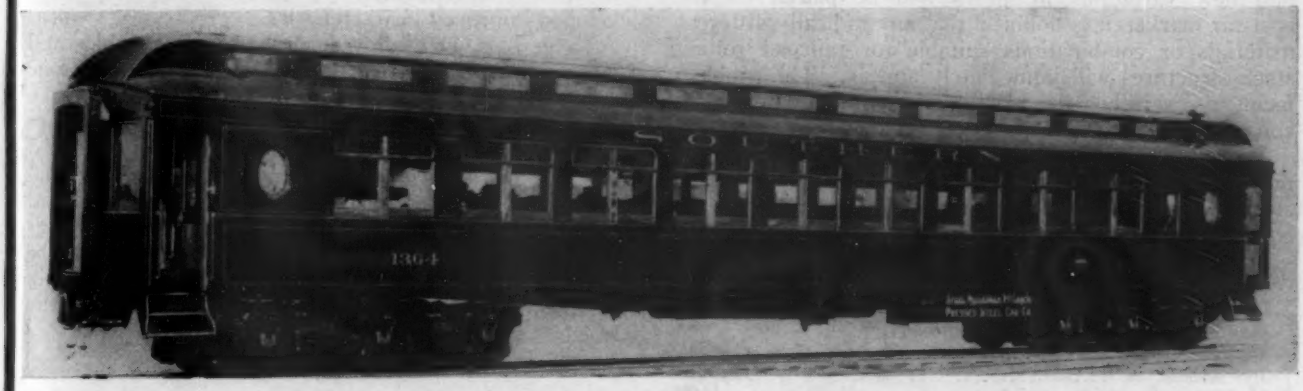
The reduction of the weight figures to a per-passenger basis in Table III is a method of comparing the amount of service the individual passenger of the three eras received from the railroads. In order directly to compare the late twenties coach with a modern coach, the deluxe coach has been stripped of the comfortable lounge rooms, substituting small toilets in their stead, and the seat spacing has been reduced so as to accommodate 84 passengers. These figures are tabulated in the last column. With reference to the weight of complete car and weight of complete body, this added column emphasizes the additional comforts of the large lounge rooms and the spacious seating with a decrease in total coach revenue and an increase in the weight hauled per passenger. This may be presented as an argument for further decreasing the complete car weight in order to increase the revenue per passenger pound.

Omitting the 56 passenger coach for the present, the weight of body specialties shows that the service per passenger in the form of comfort and safety attributable to the specialties has been considerably increased. Now considering the deluxe coach, this service is abruptly increased to almost twice that of the late twenties coach. The fewer passengers also provide less revenue out of which to amortize this increased cost. The columns containing the weight of body without specialties accentuate the body weight reduction per passenger without penalizing the strength or safety of the structure.

Tables I through III place emphasis on the remarkable service being offered by the railroads to the public through the medium of the deluxe cars. The specialties have increased considerably in number, and therefore, in total weight. Some of the individual manufacturers have obtained weight reduction through use of the light metals or through a more efficient application of steel, but the general trend has been decidedly opposite to that of the body structure. The specialties hold a field for weight reduction, dependent upon certain factors which will be discussed later.

Development of Materials

The development and first application of the Alloy Steels was spread over the era of awakening weight consciousness before and during the building of the early streamliners, and today the majority of these cars are



Passenger Coach Built By Pressed Steel for the Southern in 1906

Interior of the 1906 Southern Coach

Modern De Luxe Light Weight Coach in Which Welding Has Been Used Extensively

constructed of this material. Aluminum was first used to lighten the inside finish. Cars constructed of each metal have proven their worth under conditions of severe service.

The non-structural material of a coach holds an opportunity for the application of magnesium and the justification for its use will be its cost-weight ratio. While certain new variations in alloys will be placed on the postwar market, it is doubtful that any radically different materials or combinations suitable for railroad rolling stock structures will immediately appear. The problem facing us is rather the placing of existing materials of construction into their proper economic sphere of use.

We are all probably familiar with the use of steel in the modern streamlined car. The structure is of an alloy steel, the trucks of an alloy- or common-steel casting, the equalizers and axles of steel forgings and so on.

Table IV—Comparison of Open Hearth and Low Alloy Steels

	Open hearth	Low alloy
PHYSICAL PROPERTIES		
Elastic modulus, lb.	30,000,000	30,000,000
Yield strength, lb. per sq. in.	32,000	50,000
Ultimate strength, lb. per sq. in.	60,000	70,000
BASIC DESIGN STRESSES (lb. per sq. in.)		
Tension	16,000	25,000
Shear	10,000	15,600
Bearing	20,000	31,200

Table V—Typical Properties of Magnesium

Alloy	Weight, lb. per cu. in.	Elastic modulus, lb.	Yield, lb. per sq. in.	Ultimate lb. per sq. in.
Magnesium	0.065	6,500,000	27,000	42,000
Aluminum 17S-T	0.101	10,300,000	32,000	55,000

The cars before the streamliners were assembled by riveting relatively heavy sections together. Today thin alloy-steel sections are either riveted or welded together with welding resulting in the lighter car. The rapid cooling associated with spot welding tends to change the adjacent structure of the metal and this in combination with the dynamic buckling of thin sheets in service may cause fatiguing at the weld. A number of years ago some experiments were undertaken to determine the relative ability of two types of spot welded low alloy steel specimens to withstand a tensile loading. The results of this investigation emphasize the importance of properly stiffening thin spot-welded low-alloy steel side sheets against the formation of dynamic buckles in service in order to avoid tensile-fatigue failure.

That steel may be commercially welded so as to develop the full required strength is an outstanding economic and design advantage. This statement presumes welding quality and process control. Welding may be designed to maintain continuity of joint and it will avoid expensive and unsightly riveting. Various clips, supports, and clamps can be readily welded in place; avoiding punching, reaming, and riveting these items. Water-tight joints can be ensured and errors of workmanship corrected.

At first, there was complaint about the formability of low alloy steels. While their general formability still holds room for improvement, we have become familiar with their characteristics. The steel companies have developed improved characteristics.

As a new product, alloy steels had their troubles and it was necessary to learn how to fabricate them. At one time the forming die cost attached to a car may well have been a considerable portion of the total but the proper application of welding has reduced this considerably. Compare the all welded bolster with flame cut diaphragms to the riveted bolster having pressed diaphragms.

For long steel shapes requiring accuracy, such as mouldings, either the draw bench or power rolls may be used. These methods are limited by the characteristics and thickness of the steel that may be economically formed.

Steel Castings

Steel castings play a large part in the make-up of a car. Welding has replaced a considerable number of castings in the car structure and is justified in so doing as long as the weldment is satisfactory in both the economic and engineering sense.

Castings have certain adaptabilities that are hard to beat. This has particular reference to the ease of filleting and flowing from one section to a different one in such a way as to avoid discontinuity and abrupt stress concentrations. This can be a critical consideration where the structure must withstand heavy shocks.

A properly designed weldment will generally weigh less than a steel casting. Thinner high tensile sections may be used than a good foundry practice will allow for casting walls. It may be that a combined weldment and casting should be employed to meet a given set of conditions.

Truck equalizers are expensive forgings. Some development is at present under way towards casting these in a high-tensile steel. If preliminary design bears out in the final result, there will be a considerable weight reduction. An item as critical as the equalizer will require strict quality control in the foundry, possibly either X-ray or magnaflux.

Magnesium is today little known outside of certain wartime industries but it is apparently being successfully used both structurally and otherwise. Due to low elastic modulus and strength combined with a somewhat higher cost, magnesium is not a satisfactory structural material for railroad rolling stock, but this metal with its light weight

and suitability for extrusion can be employed for certain non-structural purposes in passenger cars.

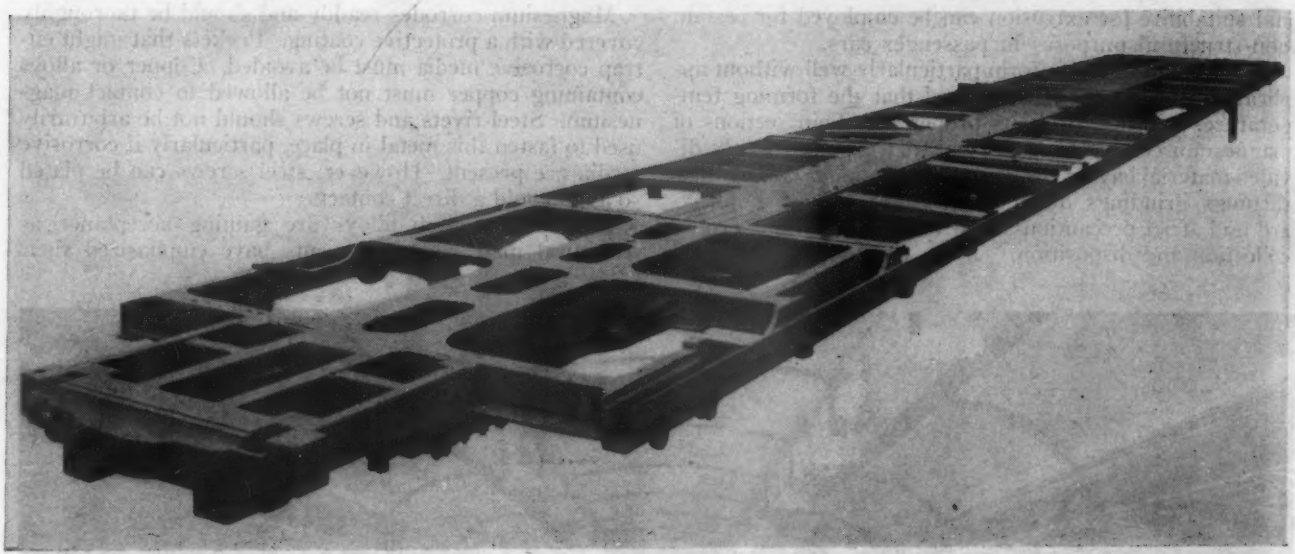
Magnesium does not form particularly well without application of heat but it is claimed that the forming temperatures will not affect its properties. Thin sections of magnesium constitutes a fire hazard; the more finely divided material having the greatest potential hazard. Chips, turnings, grindings, drillings, etc., are a serious shop hazard and strict precautions must be taken for their proper collection and disposition.

Magnesium corrodes readily and should be thoroughly covered with a protective coating. Pockets that might entrap corrosive media must be avoided. Copper or alloys containing copper must not be allowed to contact magnesium. Steel rivets and screws should not be arbitrarily used to fasten this metal in place, particularly if corrosive media are present. However, steel screws can be plated so as to avoid a direct contact.

Certain aluminum alloys are gaining acceptance as structural materials, and events have emphasized their

New York Central Coach Built in the Late 1920's

Modern De Luxe Coach Interior



Typical Underframe of a Passenger Coach of the Late 1920's

ability to withstand punishment. Several of the earlier aluminum car structures were not entirely satisfactory but improved alloys and a broader knowledge of aluminum's limitations have overcome much of this which may now be regarded as part of the education inherent in learning to use this metal.

The heat-treated and cold-worked classes of the wrought aluminum alloys holding our general interest are outlined in Table VI. These alloys obtain their strength in the manner indicated by the column headings. Some of the heat-treated alloys may also be cold worked to increase their physicals.

Nature has bestowed upon aluminum some physical characteristics quite different from steel. The elastic modulus and unit weight are both about one-third those of steel. Heating either the cold-worked or the heat-treated alloy above certain temperatures will result in a loss of strength which cannot be recaptured without a reheat treatment.

Table VI—Classification of Aluminum Alloys

Heat treated	Cold worked
17S	2S
24S	3S
53S	52S
61S	...

Table VII—Minimum Physical Properties of Aluminum Alloys

Heat treated			Cold worked	
Alloy	Ultimate	Yield	Alloy	Ultimate
17S-T	55,000	32,000	2S-¼H to 2S-H	14,000 to 22,000
24S-T	62,000	40,000	3S-¼H to 3S-H	17,000 to 27,000
53S-T	32,000	25,000	52S-¼H to 52S-H	31,000 to 39,000
61S-T	38,000	35,000		

The alloys most commonly used in passenger equipment cars for non-structural purposes are 38, 52S and 53S; and for structural purposes are 17S and 24S with 17S the more predominate.

Table VII outlines the minimum ultimate and yield strength values of these alloys. Alloy 61S-T is included as one that cannot be used structurally in passenger cars because the spread between the ultimate and yield is less than that required by the A. A. R. A modified alloy, 61S-T62, is available with the spread increased sufficiently by reducing the yield to 26,000 lb. per sq. in. The 17S alloy has a yield comparable to open-hearth steel and the A. A. R. specification, therefore, permits designs using this alloy to be based on the published design stresses for open-hearth steel. The 24S-T alloy has higher physicals than 17S-T but does not form as readily and is at present somewhat more expensive.

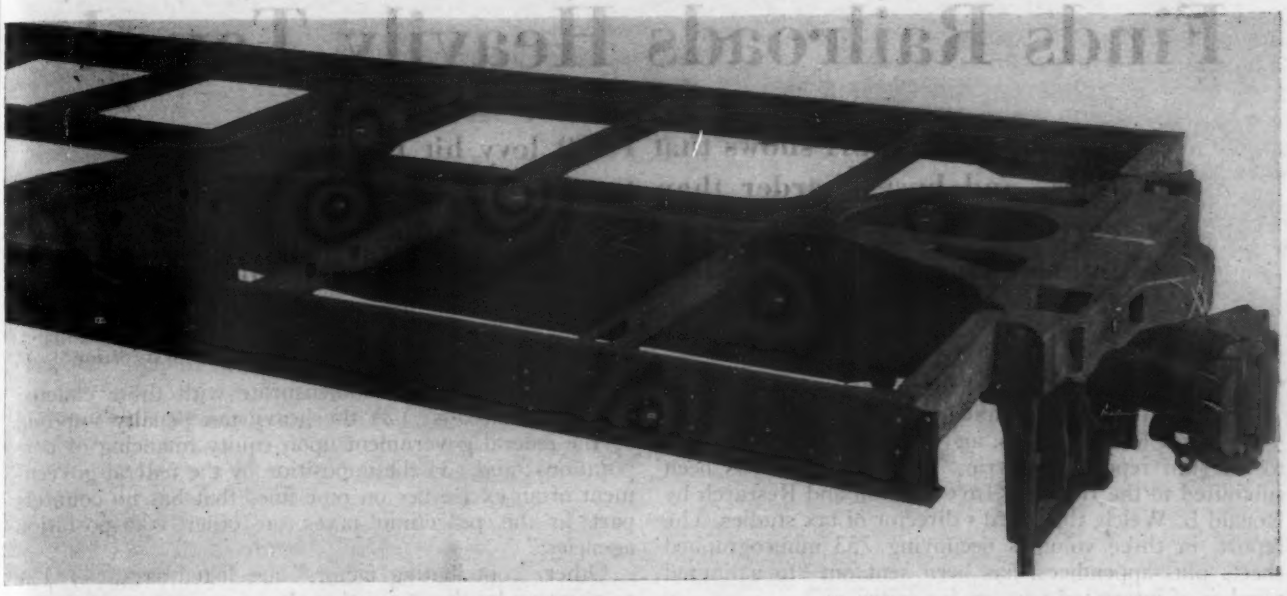
Waviness is often removed from thin alloy-steel side sheets by applying a high heat. This method cannot be employed with aluminum without some loss of strength and therefore structural aluminum sheathing should be purchased specially flattened. Fortunately, good design generally requires a thickness that will absorb considerable deflection without buckling. Careful handling during fabrication and erection must be observed. The expansion coefficient is about twice that of steel and indiscriminate hot riveting may drive sufficient metal ahead into a blind end to form a buckle difficult of removal.

The A. A. R. Specification limits to 1 in. the deflection of a passenger car having approximately 60-ft. wheel base and under an 800,000 lb. buff applied onto the rear draft lugs. This restriction combined with the low elastic modulus of the aluminum alloys imposes a limitation on the structural weight saving. Aluminum has been added to a design of car structure having a satisfactory stress analysis in order to remain within the limiting deflection.

Even though a higher-strength aluminum alloy were placed on the market in the postwar period, an analysis of the two preceding paragraphs will indicate that such an alloy cannot be economically used for outside structural sheathing or for any member affecting the deflection. However, this alloy would perform satisfactorily to reduce the weight of certain other structural members.

The effect of heat on the strength of the structural alloys has been previously remarked and this eliminates fusion welding in a member requiring maintenance of full strength. Non-structural alloys such as 3S or 52S can be readily arc, gas or spot welded. Spot welding of structural aluminum alloys is today practiced in the aircraft industry. The American Welding Society's Recommended Practice and the individual papers concerned with spot welding this metal generally stress two points; that extensive surface preparation is required and that the stored energy type of welding produces the soundest and most economical welds.

Published statements indicate that while the shear



Construction of Welded Underframe End in a Modern Light Weight Coach

strength of the structural spot welds is satisfactory, their ability to carry appreciable tensile loads is not consistent. Spot welds in the structural alloys are particularly susceptible to corrosion and require thorough protection.

Aluminum Rivets

Although aluminum rivets are available in several different alloys, steel and A17S-T alloy rivets are the most satisfactory. The 17S-T alloy rivet possesses a greater strength than the A17S-T but its qualities are such that it must be heat treated and driven immediately thereafter or held at a very low temperature until used.

The strength of A17S-T rivets is appreciably less than for steel rivets and aluminum has a tendency towards corrosion in the presence of steel. Therefore, the choice of rivets will be influenced by the severity of both the load being transmitted and the conditions of corrosion. Providing the individual parts are properly primed and the completed structure thoroughly covered by a protective coating, there should generally be no reason to fear corrosion in the passenger coach. If containers holding brine solutions are loaded through dining car vestibules, the splashing and resultant entrapment of some solution around connections will cause a materially accelerated corrosion, especially if exposed steel rivets are present.

The effect of spot welding and steel rivets on corrosion of aluminum alloys has been mentioned. Heat, no matter through what medium it is applied, will tend to lessen the corrosion resistance of the 17S-T and the 24S-T alloys. Aluminum should not be allowed to contact any materials containing an appreciable amount of copper. Certain types of composition flooring and some glues must be specified to contain corrosion inhibiting agents. If reasonable precautions are taken, however, there will be no particular need for concern.

Though it is claimed that aluminum in general passenger equipment service is resistant to corrosion, I feel that the corrosive effect of the adjacent material and the conditions of service should be examined rather than indiscriminately to specify that the car is to be built of aluminum throughout.

In general, aluminum alloys at full strength do not cold form as readily as steel. They have a tendency to crack unless a sufficiently large radius die is used but a low heat will improve this condition. The cold worked alloys may be selected of a temper to suit the severity of forming. The less the cold work the easier to form.

Shapes, structural or otherwise, of almost any cross section may be formed by the extrusion process which has the advantage of producing very lengthy sections and at the same time maintaining close tolerances. The maximum length is at present based upon a billet weight of 350 lb. at 0.1 lb. per cu. in. and the capacity of the straightening equipment.

Extrusion dies are very often, though not always, considerably less costly than pressing dies. By extruding, only one die is required for each part. The cost of rolls for complete mouldings and retainers sometimes varies between 10 to 14 times extrusion die costs.

Aluminum Car Specialties

Though aluminum has been used to some degree, ferrous metal in various forms holds the major role in the specialty field. The early discussion in this paper pointed out both the service being offered the traveling public in terms of specialty weight and the contribution of the specialties to the total car weight. The specialty manufacturers have in general not presented large over-all weight decreases with steel. In an endeavor to reduce weight, we have at times requested quotations covering both steel and aluminum. While the weight reduction may have been pleasing, the price did not always permit use of the lighter item.

The specialties hold a field for further reduction in passenger-car weight and satisfactory results can be obtained with aluminum provided the cost is reduced to an economical cost-weight ratio. I have reviewed this problem with some specialty manufacturers and the higher material price plus new manufacturing problems often materially raised the final cost.

Aluminum saved about 875 lb. per car with the air-brake specialties. The relay and control valves are both intricate castings and passengers' lives depend upon their correct operation. Casting porosity must be avoided and accomplishing this plus the cost of aluminum advanced the price.

The price of an air distribution system was consider-

(Continued on page 124)

Finds Railroads Heavily Taxed

B. I. R. staff report shows that 1940 levy hit them, the pipe lines, and buses harder than trucks, air lines, and water carriers; Childe indicates disposition to oppose user taxes, interest charges, and the like, on publicly-financed facilities

WASHINGTON, D. C.

RAILROADS, oil pipe lines, and intercity bus lines were more heavily taxed in 1940 than the intercity truck lines, air lines, and water carriers, according to the staff report on Carrier Taxation which has been submitted to the Board of Investigation and Research by Ronald B. Welch, the board's director of tax studies. The report, in three volumes occupying 753 mimeographed sheets plus appendices, has been sent out "to a limited number of interested persons for criticism."

The board's recommendations on the matter will be formed "chiefly on the basis of this staff report and the criticisms submitted in response to this invitation," said Chairman Robert E. Webb's letter of transmittal. Mr. Webb pointed out that the impending termination of the board's existence on September 18 "makes it imperative that criticisms be submitted as promptly as possible." He suggested a deadline of August 15, adding that criticisms of selected chapters "will be helpful" if some who receive it are unable to consider the whole report.

Childe Opposed to User Charges

The Webb letter also gives an insight into some of Board Member C. E. Childe's thinking on the taxation matter; for it sets forth for comment and criticism some of Mr. Childe's "tentative observations and conclusions." Chairman Webb's position is not indicated. The tentative conclusions of Mr. Childe reflect his disposition to take issue with material in the staff report which suggests that any appraisal of the comparative impact of taxes on different types of carriers should include, in cases of carriers using public facilities, consideration of adequate "user charges," "property tax equivalent," and allowances for interest on the public's investment.

Dr. Welch, the author of the report, is a former member of the faculties in the economics departments of Yale University and the University of New Hampshire, and former research director of the National Association of Assessing Officers. The investigations out of which the report has come were in response to that provision of the Transportation Act of 1940 which directs the board to study "the extent to which taxes are imposed upon [rail, motor, and water] carriers by the United States, and the several states, and by other agencies of government. . . ." This is one of the three specific assignments given to the board; the others called for investigations of the relative economy and fitness of carriers on which the board has issued a "preliminary report," and of public aids to carriers on which no reports have been issued save the land-grant-rate study submitted recently to the House committee on interstate and foreign commerce.

The "relative overtaxation" of the railroads, oil pipe lines and intercity bus lines, according to the report, is "largely" traceable to three aspects of contemporary tax institutions as follows: "(1) The failure of the states and their political subdivisions to exact property taxes from other carrier groups commensurate with those exacted from the railroads; (2) the heavy tax penalty imposed by the federal government upon equity financing of corporations; and (3) the imposition by the federal government of an excise tax on pipe lines that has no counterpart in the peacetime taxes on other transportation agencies."

Other "contributing factors" are listed as: "(4) The assumption by the states that they are more severely restricted by the federal constitution in the taxation of interstate carriers than seems justified in view of recent court decisions; (5) the failure of both federal and state governments to levy user charges upon the truck lines, air lines, and water carriers sufficient to cover a fair share of highway, airway, waterway, and public terminal costs plus a reasonable property tax equivalent; and (6) a considerable amount of multiple taxation of buses under state vehicle and carrier license tax laws."

The foregoing is set forth in the report's 57-page "summary of findings and conclusions," which got under way with comment on the origins of the tax study and its relation to other studies of the board. The fact that the act makes the tax study coordinate with the studies of public aids and relative economy and fitness "does not mean that these subjects were regarded as independent," the report says. It goes on to suggest that the "interrelationships" may be stated as follows:

"A carrier which is the recipient of public aids, over and above any taxes or other charges exacted in return for such aids, or which pays less than its fair share of taxes for the support of the general functions of government, is able to handle traffic at prices that do not cover the full cost of transportation, public as well as private, and to compete successfully in fields for which it is inherently less fit than other carriers not similarly favored. Conversely, a carrier which is overtaxed is forced, immediately or eventually, to retire from fields of service in which it would be able to compete effectively except that one of its expenses—taxes—has been inflated by government fiat. Under these circumstances, the transportation system is precluded from making its maximum contribution to the national income with a given share of our limited capital and labor resources."

Taxes May Wreck Rail Future

Later on in its chapter on the taxation of railroads, the report hails railroad wartime achievements which "have discredited many of the prophesies of the 'Thirties," but warns that the future of the railroads "will not be an easy one." It questions whether the present optimism concerning that future "is justified in the face of a vast expansion in ship- and plane-building facilities, large water and air transport fleets that can be partially converted from military to civilian use, a considerably expanded pipe-line network, and ubiquitous proposals for highway construc-

tion as part of a large program of post-war public works." Conceivably, the report adds, the future of the railroads "may be one in which a relatively small handicap will be of decisive influence. Tax policies and institutions could easily provide such a handicap, as they are alleged to have done during the 20 years prior to the war."

Taxes of the year 1940 were selected for many of the analyses appearing in the report "because it was one of the two years for which tax data were acquired for all carrier groups, it was presumably less abnormal than a more recent year, and yet it is recent enough to reflect most of the taxes now in force." A table of 1940 tax accruals for all major carrier groups shows that railroad accruals amounted to $425,929,000; intercity truck lines, $25,769,000; intercity bus lines, $16,229,000; water carriers, $24,786,000; air lines, $4,151,000; pipe lines, $43,324,000.

Of the railroad total, $232,044,000 were state taxes, and $193,885,000 federal taxes. Largest single item on the railroad list was the ad valorem property tax of $200,734,000; and next in turn came payroll taxes, $120,958,000, and net income taxes, $70,758,000. No other group, save the pipe lines with their payments of $7,503,000, was assessed as much as a million dollars in ad valorem property taxes. That figure for intercity truck lines was $631,000; intercity bus lines, $629,000; water carriers, $916,000; air lines, $181,000.

Income Levy Principal Water-Line Tax

The largest tax paid by the highway carriers was the motor fuel tax—$10,362,000 for the truck lines, and $5,006,000 for the bus lines. The income tax was the largest 1940 levy on the water carriers; it amounted to $16,349,000 or 66 per cent of their total taxes. Income taxes topped the pipe line list also, but they were exceeded slightly in the case of the air lines by the motor fuel and oil taxes.

The report points out that these tax accrual figures are incomplete for all carrier groups, and the percentage of coverage varies from one group to another. Generally it is estimated that the coverage "is in the neighborhood of 70 per cent of the transportation industry, exclusive of private carriers," although the coverage of the domestic intercity transportation industry is "conceivably higher."

Discussions of the impact of various types of taxes on the several carriers deal first with the ad valorem property tax, pointing out that this has traditionally been the heaviest tax on the railroads. It has a comparable impact on the pipe lines but rests lightly on the motor carriers, water carriers, and air lines. Meanwhile the total tax figure of the water carriers, as the report puts it, "was not swollen by payments for the use of publicly owned facilities, for the only tax which could be construed as such was the federal tonnage tax on vessels operating in foreign commerce, and this was paid in negligible amount."

Equity Demands "Property Tax Equivalent"

Coming to its consideration of the "property tax equivalent," the report points out that the highway, water and air carriers "operate upon ways that are constructed and maintained by governments," while "most airports and a substantial number of water carrier terminals are also publicly owned and operated." "These facilities," it adds, "are not subject to the property taxes which the rail and pipe line carriers must pay on their ways and terminals, and it appears that charges made for the use of the facilities are seldom set with any expectation of recovering a property tax equivalent. Unless such an equivalent is collected, a competitive advantage is gained over carriers which are obliged to operate entirely with private capital."

It is readily admitted, however, that "the principle of the property tax equivalent is much simpler than its computation," which must necessarily be "a rough approximation of the taxes which the property in question would yield if it were to be transferred to private ownership." Mention is made of such difficulties as the lack of evidence bearing on the market value of the highways, waterways, and airways, and the fact that investment figures make no allowance for "imprudent developments." Thus the suggestion that "the recovery of the property tax equivalent on a base closely approximating the unamortized investment in publicly owned carrier facilities may be a proper objective with respect to future investments but is not feasible with respect to many existing facilities."

Examination of the income tax set-up with special reference to "the penalty that the customary net income tax imposed on equity financing" convinced the staff that this matter should be adjusted. Truckers are found to have been quite fortunate in the matter of escaping state income taxes which practically always catch up with railroads and bus lines. With respect to the excess profits tax, it is pointed out that the air lines "have the advantage of a provision in the law exempting them from tax if their profits are excessive only because of receipts from carrying the mails."

When it comes to payroll taxes the railroads "not only pay old age insurance taxes at a much higher rate than other employers, but they pay both old age insurance and unemployment compensation taxes on a broader base." Here the report explains that payments in excess of $300 a month to any one person are exempt from the railroad payroll tax, "but other carriers are exempt on payments in excess of $3,000 a year—the equivalent of $250 a month in cases of continuous employment." Furthermore, "many truck operators are exempt from unemployment compensation taxes because they employ fewer than eight persons; and the maritime payrolls of water carriers, whatever the number of employees, are immune from the federal tax and from the taxes of many states."

Would Relate Motor Taxes to Highway Use

Discussions of motor fuel and license taxes bring out the staff's view that the registration levy "has serious deficiencies unless it is felt that a substantial 'stand-by' charge is a justifiable aspect of highway finance." Later on the report asserts that "motor vehicle taxes that are not related to the extent of highway use, whether designated as vehicle registration taxes or motor carrier license taxes, not only fail to distribute highway costs equitably among intrastate motor vehicle operators but also result in multiple taxation of vehicles operating across state lines."

In the latter connection it does not seem to the staff that "reciprocity" arrangements will be extended or will even be maintained on the present basis. "The only permanent solution to the problem of multiple license taxes for vehicles operating regularly in two or more states," the report says, "seems to lie in a tax whose base is allocated among the states of operation."

Finally comes the report's consideration of comparative tax burdens on carriers. It mentions several possible norms, but accepts "with minor qualifications" what it calls the "neutrality standard," i. e., "the amount of taxes that would be paid if a given sum were to be raised from the subjects of comparison in such fashion as to minimize the effect of government upon the direction and extent of business enterprise."

The report makes it clear that the staff's choice "does

not imply condemnation of the policy of government construction and maintenance of facilities used by certain of the commercial carrier groups." However, "such a policy must be accompanied by an adequate system of user charges if underdevelopment of other types of transportation is to be avoided."

What "Model Tax System" Would Do

The next step in the report's process of testing the comparative tax burdens on carriers is to work out a "model tax system" embodying four levies as follows: (1) A tax of 1.9 per cent of the going concern value of carrier operating property, exclusive of representative intangibles; (2) a payroll tax high enough to raise from each of the carrier groups the amount actually accrued in old age insurance taxes; (3) a tax or group of taxes upon the users of public ways and terminals high enough (after crediting any user charges other than taxes) to cover a fair share of (a) the maintenance costs incurred by government, (b) depreciation on the publicly owned property, (c) interest on funds invested in publicly owned property and derived by borrowing, by general taxation, or by special taxation of persons other than such users, and (d) a property tax equivalent on the publicly owned property; (4) a business tax of five per cent upon the national income contribution of each carrier, computed after deducting the foregoing taxes but before deduction of this tax. [The "national income contribution" is defined in a footnote as an amount substantially equal to a carrier's net operating income plus wages and salaries; it represents "the amount of income produced by the business entity and available for distribution among the three factors of production—labor, management, and capital."]

The ratio of the actual 1940 tax payments of the carriers to estimated payments under the "model tax system" are set up as follows: Pipe lines, 1.92; bus lines, 1.04; railroads, 1.02; truck lines, 0.75; air lines, 0.38; water carriers, 0.26.

In another test of relative tax burdens, the report relates the actual tax payments "to an evidence of taxable capacity rather than to hypothetical tax payments." In this connection it is suggested that tax payments might be related to operating revenues, net operating income, or "national income contributions" as defined above. The report points out that the staff prefers the latter although it does not regard any of the three bases with complete favor. In any event, the test shows that the tax burden as measured by the relationship of actual tax payments to "national income contribution," is relatively heaviest on the pipe lines, with the bus lines next and the railroads "a close third."

"Whether the truck lines are fourth or sixth," the report goes on, "depends upon the numerator construction. The truck lines appear to be less heavily burdened by general taxes than the water and air carriers; however, they pay special-benefit taxes in much greater volume than either of these other two groups and may therefore be said to have a heavier total tax burden."

The Childe Statement

Board Member Childe first assails the staff's general conclusion that the pipe lines, bus lines, and railroads were more heavily taxed in 1940 than the truck lines, airlines and water carriers. That finding, he says, is derived "from consideration of the subject solely from the standpoint of the tax specialist, and is based on methods of appraisal which apparently are commonly followed by tax administrators, but which seem to me to be of highly questionable merit."

In addition, the report's assumptions as to the amount of "user" costs and "property tax equivalents" chargeable to highway, water and air carriers appear to Mr. Childe "to be excessive and unjustifiable." Later on Mr. Childe points out that the staff's "model tax system" would have increased the 1940 user taxes of for-hire trucks about $50,000,000; bus lines, $4,000,000; air carriers, $8,500,000; and "would have added to the taxes of water carriers more than $100,000,000." He added: "The report does not specifically advocate the collection of user taxes in this volume, and in fact recognizes the impracticability of doing so in the case of water carriers. However, acceptance of the principles underlying this method of comparing tax burdens would presumably result in very large increases in user taxes, not only for for-hire carriers, but for the private carriers as well."

Sees "Multiple Taxation"

Also, Mr. Childe is "unable to accept the idea that interest on total public investment and tax equivalents to private property taxes should be exacted from carriers using public property as their rights-of-way." He is aware of the fact that "some economists" regard interest as part of the "economic cost" of public property, but he undertakes to demonstrate the "fallacy" of such reasoning by resorts to the *reducto ad absurdum* device. He asserts that what such economists fail to realize "that only a small fraction of the world's capital, private and public, actually yields, is expected to yield, or could yield, interest or the equivalent of interest. And he follows through to refer to "the Scotsman, Hamilton, (Knight, *Economic Principles in Practice*, p. 400) who calculated that a British penny, compounded at five per cent from the time of Christ to 1771, would have reached a sum greater than 500 million earths, all made of solid gold."

"If public works, paid for by taxes, are subsequently taxed to pay interest and amortization on the investment, the result is that the public taxes itself many times, instead of once, for the cost of the works," Mr. Childe continues. "Likewise, if the public proceeds to tax itself for the use of public works, an additional sum equivalent to taxes which would be exacted from private property, the result is simply further multiple taxation. Obviously, there could be no over-all public benefit from the adoption of such tax policies. The application of such taxes to carriers would have the effect of increasing the tax burden upon consumers and reducing the tax burden upon property and income."

The Most Important Consideration

Meanwhile, Mr. Childe had conceded that "the importance of taxing carriers fairly with relation to each other and to the general taxpayer will be generally admitted." He thinks, however, that one gage which the staff report "almost completely neglected" is that which would call for "consideration of carrier taxes in relation to the duty of carriers as public servants to render adequate transportation service at the lowest possible cost to the public."

"From the public standpoint," he insists, "the most important consideration is that carrier tax policies be such as to foster, or at least not to discourage, the development of a national transportation system which will best serve commerce and the general welfare. From this standpoint, as the staff will undoubtedly agree, all carrier taxes should be as low as possible, considering the expenses incurred and the benefits conferred by

government in connection with the maintenance of the carriers' properties and services."

Getting into railroad taxes, Mr. Childe explains the rail lines' role as the largest taxpayers in the transportation group by pointing out that they are the largest of the transportation systems, and that they own, and pay taxes on, their rights-of-way, "whereas the other carriers, except the pipe lines, operate over rights-of-way owned by the public." In the latter connection, he even concedes that "on principle, it would seem that since taxes are collected to defray government expenditures made to provide public benefits, taxes should be exacted in proportion to (a) the cost of government services rendered; (b) benefits conferred by governments; (c) ability to pay."

The "Poor Man's Friend"

He then proceeds to rationalize in this way: "All taxes, no matter from whom they are collected originally, must finally come from personal incomes or capital accumulations. Business taxes which are part of the cost of doing business and 'passed on' in prices of the products or services, are in reality taxes borne by purchasers of such products or services. This is especially true of taxes exacted from for-hire carriers. Carriers in fact are tax collectors, rather than taxpayers; since they pass the taxes along to consumers in their rates and charges. Carrier taxes, therefore, are similar in effect to sales taxes, viz., that the burden falls disproportionately on people of small incomes, who must spend most or all of their entire receipts for necessities. Property, personal income, inheritance, and capital gains taxes, which place the greater share of the tax burden upon the rich and prosperous, are therefore to be preferred to carrier taxes and consumer taxes which bear heavily upon people in poor and moderate circumstances."

At the same time Mr. Childe would give "due consideration" to the "cost of government services rendered to carriers, and the feasibility of assessing taxes against carriers to meet these costs." His own consideration of these matters seems to have convinced him that property taxes, of which the railroads are the heaviest payers in the transportation group, "are justified on both theoretical and practical grounds." Moreover, he assembles data from which he draws the conclusion that "on the whole the valuations of railroad property for tax purposes are relatively low," amounting, as Mr. Childe calculates it, to $10.4 billions, as compared with the Interstate Commerce Commission's rate-making value of $18.8 billion.

This finding that the property tax is an equitable levy need not worry the water carriers, air lines, or motor carriers, for, as Mr. Childe puts it, "property taxes are a small part of the total taxes paid by those carriers, and changes upward or downward, to equalize assessed values with actual or book values, would have little bearing on rate levels or the competitive position of those carriers in comparison with the railroads."

Childe Sums Up

Next comes Mr. Childe's rejection of user charges, interest charges, and tax equivalents for publicly-financed transportation facilities, as noted above. He then sums up, saying that the conclusions which he reaches from reading the staff report may be set forth as follows:

Railroads are relatively heavy taxpayers only in the sense that they are large owners of property and therefore pay relatively large property taxes, in comparison with highway carriers, water carriers, and air carriers. Income taxes, because they are computed on net incomes after deducting interest payments, are relatively low for railroads. From the standpoint of ability to pay (measured by net operating income), railroad taxes are low, compared with other carriers. Pipeline carriers are relatively heavy taxpayers, because they are large owners of property and because they pay heavy special pipeline taxes. But carriers are relatively heavily taxed, largely because of high special taxes, multiple state taxation, and because their property taxes are high in relation to the book value of their property. Truck and bus carriers pay property taxes which are relatively high in relation to book value. The special "user" taxes which comprise a large part of their tax burden appear to be adequate, on the whole, to pay their share of highway costs. In relation to net operating income, truck and bus carriers are relatively highly taxed. Water carriers and air carriers pay relatively low taxes, largely because user taxes are not assessed against these carriers to pay for their use of the public waterways and airways. If user taxes were exacted they would have to be passed on to the public in higher charges or the carriers would go out of existence. As is implied but not elaborated in the staff report, the possibility should be considered whether the exaction of such user taxes would force the charges of water carriers and air carriers to such high levels that the value of their services to the public would be lost and the carriers could no longer continue.

In addition to its general request for comment and criticism and its call for discussion of Mr. Childe's "tentative observations and conclusions," Chairman Webb's letter of transmittal invites discussion of specific points in the staff report as follows: The method of appraising carrier property for tax purposes, particularly the extent to which cost data should influence the appraisal; the need for amendment of the federal income tax law; the concept and computation of property tax equivalents on publicly-owned carrier facilities; the meaning of relative overtaxation of business concerns; the methods of identifying and measuring relative overtaxation, particularly (a) the merits of the "standard" and "model" tax systems, as outlined in the report, as measures of relative over- or under-taxation, (b) the contention that charges for the use of publicly-owned facilities must be high enough to cover full interest cost if the tax system is to be "neutral," (c) the selection of "national income contributions," in preference to operating revenues or income, as the best single measure of taxable capacity of business concerns.

If interested parties, in addition to commenting on the staff report, "care to suggest recommendations which might appropriately issue from the board," Chairman Webb gives assurance that such proposals "will be given careful consideration."

★ ★ ★

"First Army of the Home Front," Roseville, Cal.

Mexican laborers who aid the Southern Pacific in maintaining over 8,500 miles of roadbed and track.

'44 Purchases Are Up 30 Per Cent

Class I roads spent $415,302,000 in first quarter for fuel and supplies — Expenditures for crossties $21,843,000 — greater than for the entire depression year 1933

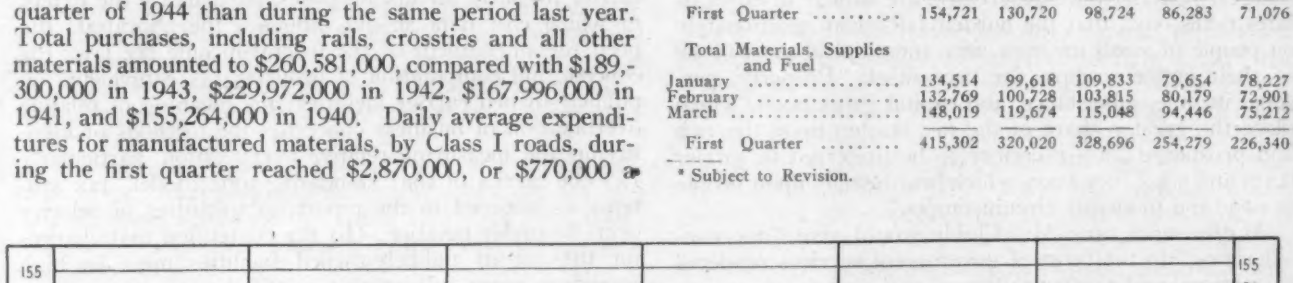
RAILWAY purchases of fuel, materials and supplies by Class I roads during the first quarter of 1944 increased 30 per cent over the same period last year and aggregated $415,302,000 compared with $320,020,000 during the comparable 1943 period, according to estimates prepared by *Railway Age* and based upon special reports received from 89 individual carriers. This year's first quarter purchases were 26 per cent greater than for the same period two years ago, 63 per cent greater than the first quarter of 1941 and 83 per cent more than for the similar period in 1940.

Excluding fuel, Class I railways spent 38 per cent more for materials received from manufacturers during the first quarter of 1944 than during the same period last year. Total purchases, including rails, crossties and all other materials amounted to $260,581,000, compared with $189,300,000 in 1943, $229,972,000 in 1942, $167,996,000 in 1941, and $155,264,000 in 1940. Daily average expenditures for manufactured materials, by Class I roads, during the first quarter reached $2,870,000, or $770,000 a

Railway Purchases—Class I Roads

Miscellaneous Materials and supplies	1944* (000)	1943 (000)	1942 (000)	1941 (000)	1940 (000)
January	70,938	51,147	69,060	45,457	45,593
February	69,861	50,531	63,216	43,467	39,939
March	79,353	59,381	71,172	54,070	42,655
First Quarter	220,152	161,059	203,448	142,994	128,187
Rails					
January	5,619	4,471	3,075	3,464	3,529
February	5,481	4,033	3,817	5,297	4,815
March	7,486	4,385	3,770	5,168	6,042
First Quarter	18,586	12,889	10,662	13,929	14,386
Cross Ties					
January	7,056	4,118	4,895	3,472	4,128
February	6,831	4,622	4,837	3,514	3,928
March	7,956	6,612	6,130	4,087	4,635
First Quarter	21,843	15,352	15,862	11,073	12,691
Total Materials and supplies (less fuel)					
January	83,613	59,736	77,030	52,393	53,250
February	82,173	59,186	71,870	52,278	48,682
March	94,795	70,378	81,072	63,325	53,332
First Quarter	260,581	189,300	229,972	167,996	155,264
Fuel					
January	50,901	39,882	32,803	27,261	24,977
February	50,596	41,542	31,945	27,901	24,219
March	53,224	49,296	33,976	31,121	21,880
First Quarter	154,721	130,720	98,724	86,283	71,076
Total Materials, Supplies and Fuel					
January	134,514	99,618	109,833	79,654	78,227
February	132,769	100,728	103,815	80,179	72,901
March	148,019	119,674	115,048	94,446	75,212
First Quarter	415,302	320,020	328,696	254,279	226,340

* Subject to Revision.


RAILWAY MATERIAL PURCHASES
Class I Railroads
Excluding Equipment
Source: Railway Age Records
Fuel
Rail
Cross ties
Other material
Millions of Dollars
Millions of Dollars
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1939
1940
1941
1942
1943
1944

day *more* than for 1943 and $1,150,000 a day *more* than in the same period in 1940.

Miscellaneous materials and supplies (these purchases include materials for the maintenance of cars, locomotives, roadway and structures but exclude rails, ties and fuel) amounted to $220,152,000 for the first quarter, an increase of 37 per cent over last year's $161,059,000; eight per cent more than for the same period in 1942; 54 per cent greater than for the first quarter of 1941 and 72 per cent more than for that period in 1940. The big spurt in miscellaneous materials developed during the month of March when purchases exceeded those for February by $9,492,000 and bettered the January figure by $8,415,000.

Among the bright spots in the over-all material picture, the roads received 44 per cent more rails than in the first quarter of 1943, 74 per cent more than in the corresponding period of 1942, 33 per cent more than they received in the first 90 days of 1941 and 29 per cent more than in the first three months of 1940. In fact, expenditures for rails have exceeded those of the first quarter for every year since 1931, the first year that *Railway Age* records show rails as a segregated item in the volume of railway purchases.

Expenditures for crossties during the first quarter amounted to $21,843,000, the greatest for any similar period since 1930 and $2,000,000 more than for the entire 12 months of the depression year 1933. By comparison, crosstie expenditures for the first quarter exceeded those for respective quarters by 42 per cent in 1943, 13 per cent in 1942, 55 per cent in 1941 and 68 per cent in 1940. Crosstie expenditures during the first quarter of 1944 exceeded those for the first eight months of 1932 and for the entire first half of the years 1934-1939 inclusive.

Fuel purchases for the first quarter amounted to $154,721,000, 18 per cent more than $130,720,000 spent for this purpose in the same period last year, 57 per cent more than the $98,724,000 in the first 90 days of 1942, 79 per cent more than the $86,283,000 in the first three months of 1941 and 118 per cent more than for the first quarter of 1940, when expenditures reached $71,076,000. Expenditures for fuel during the first quarter of 1944 exceeded the purchases for the first seven months of 1931, 1935, 1936, 1938, 1939, and 1940; they also exceeded the total fuel purchases for the first 10 months of 1932 and 1933 and were greater than similar purchases for the first 6 months of 1937.

First Quarter Railway Purchases of Miscellaneous Materials and Supplies for Maintenance of Cars, Locomotives, Roadway and Structures (Excluding Rails, Ties, Fuel)

Railway	Mileage	1944	1943	% Change
Akron, Canton & Youngstown	171	$69,827	$61,729	+13
Alton	959	868,577	980,996	−11
Alton & Southern	32	80,674	66,312	+22
Ann Arbor	294	127,727	98,943	+29
Atchison, Topeka & Santa Fe	13,147	17,646,697	5,748,643	+207
Atlanta, Birmingham & Coast	639	160,901	129,597	+24
Atlantic Coast Line	4,966	3,135,636	2,803,338	+12
Baltimore & Ohio	6,382	9,386,844	7,087,908	+32
Bangor & Aroostook	597	175,720	161,664	+9
Bingham & Garfield	78	27,977	396,884	−30
Boston & Maine	1,825	1,923,912	1,405,005	+37
Cambria & Indiana	61	44,948	20,681	+117
Central of Georgia	1,816	890,966	524,387	+70
Central of New Jersey	692	1,341,630	1,227,900	+9
Central Vermont	422	201,085	130,214	+54
Charleston & Western Carolina	343	111,905	106,167	+5
Chesapeake & Ohio	3,073	3,846,012	2,818,944	+36
Chicago & Eastern Illinois	912	823,352	485,897	+69
Chicago & Illinois Midland	131	96,908	75,655	+28
Chicago & North Western	8,100	4,493,633	2,866,396	+57
Chicago, Indianapolis & Louisville	520	219,315	184,005	+19
Chicago, Milwaukee, St. Paul & P.	10,761	5,545,043	2,527,069	+119
Chicago, Rock Island & Pacific	7,751	4,063,451	3,080,607	+32
Chicago, St. Paul, Minn. & O.	1,622	646,484	383,240	+69
Clinchfield	309	266,039	202,650	+31
Colorado & Southern	748	655,744	447,029	+47
Columbus & Greenville	168	34,418	32,307	+6
Delaware & Hudson	848	1,043,489	1,045,785	...
Delaware, Lackawanna & Western	984	1,769,388	1,361,628	+30
Detroit & Mackinac	244	16,171	17,988	−10
Detroit & Toledo Shore Line	50	31,027	39,188	−21
Detroit, Toledo & Ironton	464	121,062	129,157	−6
Duluth, Missabe & Iron Range	544	622,211	474,154	+31
Duluth, South Shore & Atlantic	535	67,115	60,086	+12
Elgin, Joliet & Eastern	392	571,123	625,092	−9
Erie	2,418	2,697,781	2,408,070	+12
Florida East Coast	682	649,595	429,419	+51
Fort Worth & Denver City	804	496,486	388,277	+28
Great Northern	8,125	4,840,012	3,619,557	+34
Gulf, Mobile & Ohio	1,972	706,573	529,373	+33
Illinois Central	6,607	6,913,782	6,463,419	+7
Kansas City Terminal	170	233,948	158,094	+48
Lake Superior & Ishpeming	156	45,510	22,523	+102
Lehigh & Hudson River	96	54,989	82,724	−34
Lehigh and New England	190	80,368	46,499	+73
Lehigh Valley	1,260	1,966,366	1,360,063	+44
Louisiana & Arkansas	852	286,853	349,815	−18
Louisville & Nashville	4,745	3,458,599	2,814,565	+23
Maine Central	991	498,457	341,952	+46
Minneapolis, St. Paul & S. S. M.	4,277	969,771	873,501	+11
Mississippi Central	158	29,758	36,576	−19
Missouri & Arkansas	365	35,895	43,397	−17
Missouri-Kansas-Texas	3,293	1,752,756	1,985,836	−12
Missouri Pacific	9,985	6,625,410	4,894,347	+35
Monongahela	172	68,378	37,336	+83
Montour	51	62,096	34,742	+79
Nashville, Chattanooga & St. Louis	1,085	1,206,812	841,945	+43
New York Central	10,766	18,328,243	14,029,632	+31
New York, Chicago & St. Louis	1,688	1,562,863	1,301,567	+20
New York, New Haven & Hartford	1,838	3,592,517	2,781,003	+29
New York, Ontario & Western	546	156,484	187,700	−17
Northern Pacific	6,868	3,636,588	2,504,768	+45
Northwestern Pacific	331	34,453	20,189	+71
Pere Marquette	1,979	1,134,288	665,502	+70
Pittsburg & Shawmut	97	32,564	21,507	+51
Pittsburg, Shawmut & Northern	190	23,355	21,856	+7
Pittsburgh & West Virginia	136	134,448	148,080	−9
Reading	1,418	3,709,177	2,273,502	+63
Richmond, Fredericksburg & Potomac	118	669,669	601,600	+11
Rutland	407	121,000	66,889	+81
St. Louis-San Francisco	4,946	2,488,847	2,547,496	−2
Seaboard	4,178	2,967,148	2,899,631	+2
Southern	7,700	7,650,699	6,660,000	+15
Southern Pacific-Pacific Lines	8,309	13,138,971	6,770,235	+94
Spokane, Portland & Seattle	947	326,683	380,041	−14
Tennessee Central	286	166,146	165,373	+..
Terminal R. R. of St. Louis	463	385,129	361,311	+6
Texas & New Orleans	4,341	2,167,402	1,669,912	+30
Texas & Pacific	1,903	1,953,896	1,724,651	+13
Union Pacific	9,817	12,671,820	9,068,914	+40
Virginian	657	1,536,468	843,023	+82
Wabash	2,381	2,337,824	1,460,010	+60
Western Maryland	842	651,715	670,809	−3
Western Pacific	1,195	1,134,900	747,400	+52
Wheeling & Lake Erie	507	421,760	387,928	+9

D. & S. L. Rail Renewal

(*Continued from page 111*)

graphs showed small blow holes at non-critical points. Future service of these welds as compared to the others, which are perfect as far as could be ascertained, may help to determine if the requirements were too severe.

After the new rail was laid, the inner guard rails were replaced. These are located throughout all the gunite-lined portions of the tunnel and had been removed before the new welded rail lengths were pulled in. New rail anti-creepers were applied, as before, with 16 Fair anti-creepers per 66-ft. length, 10 of these applied against creepage downgrade and 6 against creepage upgrade in the easterly two miles of the tunnel, and the same arrangement on the two per cent grade in the westerly half of the tunnel. Because of the relatively constant temperature throughout the main body of the tunnel, little creepage was expected, except near the portals, when continuous welded rail was first installed in 1938. Numerous markers were installed throughout the tunnel at that time, however, in order that any longitudinal movement of the rails could be detected. Curiously, no more than ¼-$\frac{5}{16}$ in. of movement was experienced, at the ends of the continuous welded rail outside the tunnel, while movement of rail up grade of as much as 1½-in. occurred at several points within the central portion of the tunnel.

No ties were renewed in this work, since all new ties were installed in 1928 when the tunnel was completed, and they are still in good average condition. Two 1500-watt Kohler light plants with 75-watt electric lights hung along the wall on each side of the tunnel were used for all of the work.

The released 112-lb. rail was cut with torches into 60-ft.

lengths to be drilled later and used in sidings or be classified as scrap. It was loaded by hand on push cars and trucked out of the tunnel to be picked up later. A little reballasting and surfacing was done after the rail was relaid, but because of the shortage of labor about all that could be done was to clean out the cinders before the relay, remove the guard rails, complete the welding and relay work, replace the guard rails, and do a little spot surfacing work. Some foul ballast was trucked out, using push cars and dump boxes.

Approximately 80 per cent of the tunnel is ballasted with granite rock ballast and 20 per cent with volcanic rock ballast.

Many Difficulties

In addition to doing this work without interfering with the largest volume of traffic, this line has ever carried, the labor problem also delayed operations considerably. It was originally intended to do this work with a gang of 80 men but the gang was never this large and varied from 40-60 men, with the average closer to the smaller figure. In addition, the cold weather and high winds in January made it necessary to discontinue operations until late in the spring because of the difficulty experienced and time required to preheat the rail ends properly.

All of the work was done by Denver & Salt Lake forces, under the general direction of A. E. Perlman, assistant to the president of the Denver & Salt Lake, and also chief engineer of the Denver & Rio Grande Western. F. K. Calkins, division engineer of the D. & S. L. was in immediate charge. The research work was carried out by Ray McBrian and associates of the research department of the D. & R. G. W. Five representatives of the Metal & Thermit Corporation supervised the welding work.

Rolling Stock Materials

(*Continued from page 117*)

ably advanced due, it was claimed, to the increased material costs and the different manufacturing technique.

The rotating reclining seats afford an opportunity for a substantial reduction. With aluminum, various manufacturers offered savings varying from 15 to 25 lb. per seat. For a 56-passenger car, this is a weight reduction varying from 420 to 700 lb. and from 600 to 1,000 lb. for an 80 passenger car.

The factor that aluminum presents in the reduction of specialty weight will depend both on the ability of the specialty manufacturers together with the aluminum producers to lower the selling price and on the over-all economy to the railroads. Neither the customer nor the manufacturer will consider absorbing the additional charges required to place practical and economical aluminum specialties on the market.

We have reviewed aluminum and see that it has certain characteristics quite different from steel. The structural alloys are not presently weldable by the fusion process and therefore assembly by riveting dominates. Possibilities for corrosion must be observed when designing but need not concern us if certain fundamentals are kept in mind.

Fast hot pressing, and other shop practices, requires high temperature heating of aluminum and therefore heat treating equipment. Whether or not it will be economical to install this and other fabrication equipment will depend on the demand for railroad rolling stock fabricated from these alloys and that is a problem for the producers of aluminum. Different types of aluminum passenger equipment have been in satisfactory operation for some years and a number of aluminum hopper cars have also been undergoing service tests.

Relative Costs

The price of aluminum ranges from seven to ten times that of the low-alloy steels on a per-pound basis. Even though the elastic modulus is roughly one-third that of steel, the structure does not require three times the material and the lower weight of the aluminum alloys works to advantage. Considering the structural shell only, the proportionate total material costs in a passenger coach may drop to a 3 or 2 to 1 ratio depending on the size of the structure and the amount of steel present. The reflection of this ratio in the total cost is markedly reduced by the addition of specialty prices, labor, and operating expenses. In proportion, the cost of a freight car would be influenced considerably more than that of a passenger car.

A detailed discussion concerned with the relative economy of aluminum and steel is particularly difficult because of the changing conditions of transportation facing us in the future. Increased competition in the fields of freight haulage and passenger travel will emanate from motor and airline transportation. To competition, the railroads will offer efficient, economical, and well-maintained schedules. Passenger travel will each time be presented with a type of service that will invite them to ride by rail once again. To speed up the handling of certain commodities, high speed merchandise freight will no doubt be inaugurated. Lighter cars will be of advantage for this and general freight service.

Both original and maintenance costs contribute largely to the over-all economy of the structure. The previous discussion concerned with material cost indicated that proportionately the higher per pound price of aluminum would more strongly reflect in the total cost of a freight car than in that of a passenger car. Ability to withstand fatigue, corrosion, and hard usage are recognized maintenance factors which will affect this cost. Both the U. S. Steel Corporation and the Aluminum Company have had some hopper cars engaged in hauling coal under service tests for a number of years. Published statements at this time of the comparative results obtained with U. S. S. Cor-Ten and the aluminum alloy would be interesting.

Decline in Individual Orders

The size of individual freight-car orders has declined. Therefore, any inefficiency on the part of the car builder resulting from a material being difficult to fabricate, or from other causes, cannot now be as readily absorbed but will rather be more sharply reflected in the average cost figures. Efficient operation has to be maintained from the start of fabrication. Uniform materials of construction that meet these normal requirements of the industry for economical fabrication and assembly must be available.

The ability of either steel or aluminum to fit into this general picture as influenced by first cost, maintenance, revenue, etc., which may all be summed up as the cost-weight ratio over a specified period, will determine the degree to which each is used.

Important Changes in Scrap Regulation

REVISION of the price schedule covering iron and steel scrap, designed to provide the entire scrap industry with one regulation giving in simplified form all applicable provisions of the original schedule, has been announced by the Office of Price Administration. In its revised form, the regulation provides four major changes relating to basing point prices, an adjustment in preparation fee differentials, the combination of specifications and the elimination of railway basing points.

The new regulation, known as Maximum Price Regulation No. 4 (Iron and Steel Scrap) supersedes Revised Price Schedule No. 4 and became effective July 5. It represents the latest revision of a price schedule that dates back to April, 1941, when price control was administered by the Price Stabilization division, the first agency to be set up for that purpose.

Four Major Changes

No basic changes have been made in either price levels or the methods by which the maximum scrap prices are computed. However, the changes that have been made are of interest to the railways and were incorporated in the regulation upon the recommendation of the Scrap Iron and Steel Industry Advisory Committee and the W. P. B.

The four major changes are as follows: (1) Basing point prices are established for several grades of scrap that previously were priced by letter. (2) An adjustment has been made in the preparation for differentials between scrap rails in random lengths and short rails. (3) The separate specifications that formerly covered cast iron scrap of railroad, dealer and industrial origin have been combined to provide one set of specifications for cast iron scrap, regardless of its origin, and (4) railroad basing points have been eliminated and the basing points for steel scrap or dealer and industrial origin have been established as basing points for steel scrap of railroad origin.

No. 1 railroad cast steel, wrought iron, welding rod butts and shafting are among the grades of scrap for which new basing point prices have been established. All of these grades had been priced previously by letter.

A price of $6.50 per gross ton above the dealer base price for No. 1 heavy melting steel scrap has been established for prepared wrought iron scrap. This is $3 per gross ton higher than the price authorized previously. The increase is given because of the critical shortage of wrought iron scrap, and recognizes the higher costs involved in preparing and segregating wrought iron scrap as compared to other grades of steel scrap.

The principal result of the adjustment made by the regulation in preparation fee differentials is to provide a higher charge for the preparation of shorter length rails. The fee for cutting rails to lengths of 18 in. or less is increased from $2.50 to $3.25 per gross ton. This increase has been accomplished by reducing the price of scrap rails in random lengths and rails 3 ft. in length, 50 cents per gross ton and increasing the price of rails 18 in. in length, 25 cents per gross ton. The fee for cutting rails to 3-ft. lengths remains the same, because the 50-cent reduction in price applies both to scrap rails and rails 3 ft. in length. The grade of rails 2 ft. in length has been eliminated.

The regulation combines two sections of RPS 4 which dealt separately with cast iron of dealer and industrial origin and with that of railroad origin. Each section contained specifications for seven grades. The regulation now provides one section with one set of specifications. Ten grades of cast iron now cover all those previously contained in the two sections. The prices for the various grades of cast iron scrap in this section apply to all sellers, regardless of the origin of the material. These prices correspond with those of the original schedule.

Railways Gain 17 and Lose 4 Basing Points

The regulation eliminates the former dual basing point system under which 25 basing points covered railroad scrap and 38 covered dealer and industrial scrap. The previous dealer and industrial scrap basing points now cover all scrap regardless of origin. As 21 of the former 25 railroad scrap basing points were identical with 21 dealer and industrial scrap basing points, this action, in effect, adds 17 new basing points for railroad scrap. Four railroad basing points—Philadelphia, Pa., Wilmington, Del., Kansas City, Mo., and Wheeling, W. Va.,—have been eliminated.

The historical price relationship by which the railroad scrap basing point price is $1 higher than that of dealer and industrial scrap has not been changed by this step. In a few cases, railroads may get increased prices for their scrap as some of the new dealer and industrial scrap basing point prices will give them a higher net return. Among several other changes, certain unlisted grades of scrap, formerly classified by interpretation as one of the listed grades, are now included in the specifications for those listed grades; for example, bundles weighing less than 75 lb. per cubic foot, hand-baled cotton ties and machine gun clips. The specifications for certain grades, such as machine shop turnings, chemical borings and shovelling turnings, have been changed to show more clearly the types of material included.

Two grades, briquetted shovelling turnings and briquetted alloy free turnings, have been eliminated. Should any necessity arise for briquetting such turnings they may be classified and sold as grade No. 27—Briquetted Turnings.

An interpretation has been included clarifying the freight charges which may be added to the maximum on-line prices for iron and steel scrap of railroad origin. Provisions relating to the use of vessel rates in computing shipping point prices have been clarified by redefining the conditions under which such rates may be used and the areas to which they will apply.

The brokerage provisions have been modified. An interpretation relating to the passing on to a consumer of discounts received from the seller by the broker has been included; an interpretation permitting the payment of brokerage fees when a broker purchases scrap from a producer on a "where-is" basis has been revoked, and a condition that persons receiving a brokerage commission be regularly and primarily engaged in the business of buying and selling iron and steel scrap has been added.

The trucking provisions have been simplified by elimination of the requirement that a trucking certificate be filed where the transportation charge is at the allowable minimum of $1 per gross ton. The charges for delivery in a truck owned and controlled by the shipper are now defined as the highest established rail carload freight rate for shipping scrap from the rail siding nearest the shipping point to the rail siding nearest the point of delivery.

The "in-transit" provisions have been amended to permit the "in-transit" preparation of cast iron No. 2 (charging box cast) and the "in-transit" briquetting of either cast iron borings or steel turnings.

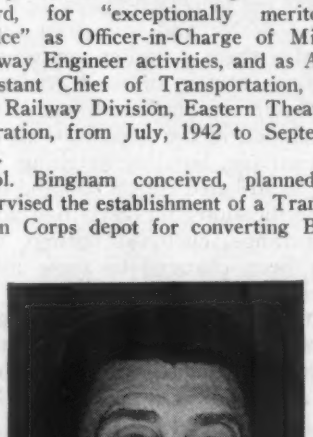
Railroads-in-War News

Bingham 2nd M.R.S. Procurement Head

Aide to General Burpee has won distinction for role in European Theater

Col. Sidney L. Bingham, in charge of stores and procurement for the railway forces operating in the invasion under Brig. Gen. Clarence L. Burpee, (as reported in the July 8 *Railway Age*, page 90) received this latest promotion, May 27. In March, by direction of the President, he was presented with the Legion of Merit award, for "exceptionally meritorious service" as Officer-in-Charge of Military Railway Engineer activities, and as Acting Assistant Chief of Transportation, Military Railway Division, Eastern Theater of Operation, from July, 1942 to September, 1943.

Col. Bingham conceived, planned and supervised the establishment of a Transportation Corps depot for converting British railway equipment to meet military requirements, the assembly of American railway equipment received in knockdown form, and the storage of equipment for future operations. He designed and took charge of the conversion of British railway rolling stock to U. S. Army Medical Corps hospital train requirements. He also designed and supervised construction of an off-track railway emergency wrecking car, known as a "breakdown lorry" which has now been adopted as standard equipment by both British and U. S. railway operating units.



U. S. Army Photo

Col. Sidney L. Bingham

His latest accomplishment, which can only now be revealed, is his plan for the conversion, within four hours, of any available continental rolling stock into emergency ward cars.

Colonel Bingham entered railway service in 1915, as chief construction engineer of the Interborough Rapid Transit Company, New York City. Following his participation in World War I, he returned to the I. R. T. working in the car department. There were promotions to the electrical engineer's department, maintenance of way and motive power.

In 1935 he became engineer and transportation officer to the president and general manager of the company. When the I. R. T. was merged into the City Transit System, he became superintendent of the entire undertaking.

Arriving in the Eastern Theater of Operations among the first contingent of Transportation Corps officers, the Colonel was assigned to planning railway operation in this area and in Africa.

In October, 1942, Colonel Bingham was appointed Officer in Charge of Military Railways, under Col. N. A. Ryan, Acting Chief of Transportation, later serving as Assistant Acting Chief of Transportation for Miltary Railways.

He is the first American army officer to receive a full membership in the British Institute of Mechanical Engineers.

M. R. S., in Italy, Gives Blood to Wounded

The War Department now reveals that for more than 17 days during the Allied drive up the Italian boot, Army railroaders donated 40 pints of blood daily, thus relieving an emergency created when blood plasma supplies were all but exhausted.

According to Brig. Gen. Carl R. Gray, director general of railways in the Mediterranean theater, when the appeal went out from the Medical department for blood donors, 2,449 Transportation Corps' members immediately answered the call. So munificent was the response only 28 per cent of the volunteers could be accepted.

Army railroaders have been closely allied to the combat troops since the North African invasion. Only recently (as reported in the *Railway Age*, of June 3, page 1081), Lt. Gen. Mark W. Clark, commanding general of the American Fifth Army, awarded the Fifth Army Plaque and Clasp to the M. R. S. in the Mediterranean area.

Enter Pact to Help Mexican Transport

U. S. agrees to cooperate on further improvement of facilities there

An agreement whereby the governments of the United States and Mexico "shall make every effort within their ability further to improve the transportation facilities of Mexico by rail, by highway, by air, and by sea" was announced July 12 in a joint statement of Secretary of State Hull and the Mexican Foreign Minister, Ezequiel Padilla.

"We have," said the statement, "discussed the general transportation system of Mexico as it affects the wartime economy of our two countries and as it shall affect our economies in the postwar period.

"The Mexican railway transportation system, which had little margin to handle more than peacetime needs, has increased enormously the volume of its traffic. It has succeeded in moving without delay to the United States, Mexico's vast output of strategic raw materials. This achievement has been the result of cooperative arrangements between the two countries whereby the United States furnished Mexico with technical advice and certain emergency equipment and supplies.

"To maintain the level of current operations during the war period such additional technical assistance as may be necessary will be furnished to Mexico and also as soon as possible additional necessary equipment and supplies. Moreover, to the limit of our wartime ability, every effort shall be made by the United States to continue to provide transportation facilities for the movement of essential goods to Mexico, while Mexico will make every effort, on her part, to reduce the strain on United States transportation facilities."

With respect to sea transportation, the two governments are agreed that regular shipping services between the two countries, interrupted by the war, shall be resumed so as to provide for the relief of overburdened rail and highway transportation facilities.

W. P. B. Tells What Forms to Use for Capital Equipment

The War Production Board has made available, in the form of Interpretation 2 of Preference Rating Order P-142, a clarification of procedures under which carriers may obtain items of "productive capital equipment" costing more than $500 per unit, it was stated on July 8.

It was pointed out that minor items of capital equipment of this nature may be

obtained under maintenance repair and operating supplies ratings, when the cost per unit, excluding labor, is not more than $500, but in the case of more costly items the usual method is to submit the applicable forms for special items of equipment, such as WPB-541(PD-1A), WPB-1319, or WPB-3131, or under L-41 if construction under that order is involved. All items which the carrier normally charges to capital account are affected by this ruling, the statement indicated, and examples mentioned included adzers, spike pullers, lathes and drill presses.

M. R. S. Ready to Take Over Normandy Rail Lines

As the Allied Army advances into Normandy, the job of reconstructing the railroads and preparing for the movement of troops and supplies deeper into France, is being assumed by the Military Railway Operating Battalions of the Army Transportation Corps.

From headquarters in the European theater of operations, has come advice of the officer personnel of the first of these battalions to move into Normandy. This battalion is under the command of Lt. Col. Ralph O. Jensen (formerly with the Soo Line, at Maywood, Ill.).

For the past year this unit has been stationed in England, and, in co-operation with British railway shops, has been engaged in the conversion of passenger trains into ambulance cars, equipping them for service as operating rooms, wards, mess halls and staff quarters.

The maintenance-of-way branch of the battalion constructed 1,800 ft. of track a day for two weeks, while another company, engaged in handling maintenance of rolling stock, assembled one type of freight car in 47 man-hours with only 30 men on the job.

Officer and non-com personnel of the battalion includes: (From the *N. Y., N. H. & H.,* in New Haven) Maj. E. B. Sweet, Capt. H. Gardiner (West Haven), Capt. J. A. Vargas, Lt. F. Kroll and Lt. F. Schneider; (*Santa Fe*) Capt. J. E. Inman; (*B. & M.*) Lt. W. Holland, Melrose, Mass.; (*C. R. I. & P.*) Lt. E. Hayes, Gruver, Ia.; (*C. & N. W.*) M/Sgt. M. R. Darlington, Alburnette, Ia., and Lt. G. F. Hyett, Chicago; (*B. & O.*) Lt. W. Gunion, Elkhart, Ind.; (*Seaboard*) T/Sgt. G. G. Stanford, Daisey, Ga.; (*P. R. R.*) S/Sgt. R. C. Ballou and T/Sgt. L. T. Maxwell, East Chicago, Ind.; (*C. B. & Q.*) Lt. J. Stringer, Amarillo, Tex.; (*Ill. Cen.*) Lt. G. W. Campbell, San Francisco, Cal.; (*A. C. L.*) Lt. C. J. Gray, Wilmington, N. C.; (*D. & H.*) Lt. B. H. Waters, Whitehall, N. Y.; (*Leh. & N. E.*) Capt. H. F. Weaver, Bath, Pa.

Handling of Record July Fourth Travel Pleases Johnson

Referring to the success with which railroads and bus lines handled the "all-time record-breaking" Fourth of July holiday passenger movement this year, Director J. Monroe Johnson of the Office of Defense Transportation said, "The public response to our 'Don't Travel' appeals was very gratifying and supports my belief that travel rationing can be avoided if we can get more public cooperation. But it must be realized that essential passenger traffic connected with the war, and civilian traffic as well, is still increasing. The peak is not yet in sight."

The risks and difficulties of wartime rail travel were again emphasized by Col. Johnson, and he called attention to the recent O.D.T. order under which accommodations may be canceled or travelers evicted from space held on trains if the railroads find it necessary to take such measures to take care of the transportation of war casualties. So far, he added, the railroads apparently have had sufficient advance notice in each case to provide necessary accomodation for casualties by withdrawing space from sale prior to departure of trains.

Over the Fourth there was "Standing Room Only" on practically every train and bus, according to the O.D.T., which also reported that there were "numerous" points where groups of 50 to 100 passengers were unable to board trains. But Col. Johnson paid tribute to the cooperation of that part of the public which refrained from unnecessary travel over the holiday, saying that without such cooperation "the holiday situation would have been completely out of hand, even though the railroads and buses are doing a heroic job in handling all-time travel peaks with a minimum of equipment and manpower."

Rail Officers May Permit Some Under-Minimum Carloads

Acceptance and forwarding of carload freight not loaded in conformity with the requirements of General Order ODT 18A may be authorized by special permit issued by the chief operating officer or division superintendent of the initial line-haul rail carrier, or of the initial switching carrier where no line haul is involved, under the terms of Amendment 2 to that order, effective July 10.

Operating officers are authorized by the Office of Defense Transportation to issue such permits in specific cases where, in their judgment, because of the unusual character of the lading, undue car detention or other unusual circumstances, strict compliance with the load requirements would result in inefficient use, or unduly retard the use, of cars or locomotives, or where such permit is required for reasons of military necessity.

Reports of all special permits issued under the provisions of the amendment must be made regularly to the O. D. T.

O. D. T. Rail Appointments

Shannon Kuhn has been appointed associate director of the Office of Defense Transportation's Division of Railway Transport, in charge of the mechanical section, and William H. Russell has been appointed assistant director of the Division of Traffic Movement in charge of car utilization. The former succeeds E. R. Hauer, who has returned to his position of engineer of motive power of the Chesapeake & Ohio-Nickel Plate-Pere Marquette Mechanical Advisory Committee; while Mr. Russell replaces Charles F. Caley, who has returned to the New York, New Haven & Hartford as transportation analyst.

Mr. Kuhn, a former master mechanic of the New York Central at Cleveland, Ohio, has been with O. D. T. since May, 1942, and was Mr. Hauer's deputy at the time of the latter's resignation. For the past two years Mr. Russell has been a director in the rail-truck conservation section with headquarters at Atlanta, Ga. He was formerly general freight agent of the Southern at that point.

New Child Labor Law Summary

The Office of Defense Transportation has issued a revised and clarified Summary of Federal and State Child Labor Laws and Regulations, which is available from the O. D. T. Division of Transport Personnel, Washington 25, D. C. This publication includes changes in child labor legislation made in the past year, according to the O. D. T. announcement, and discloses " a slight relaxation with regard to hours of work and working permits." There is no change in the listing of occupations considered hazardous for minors, it was stated.

European Theater's Transport Chief Is Promoted

The Army's transport chief in the European theater is now a major general. Fifty-one-year-old Brigadier General Frank S. Ross, who, since February 1, 1942, has had complete supervision of all highway, rail and water transportation in this area, occupies a position unique in this nation's military transportation history.

His chief responsibilities fall into three categories: movements into the United Kingdom, movements within the British Isles and, recently, after months of careful planning, the initial movement to the continent. For the success of this latter undertaking the General and his Corps received commendation by Lt. Gen. John C. H. Lee, Deputy Theater Commander.

U. S. Army Photo

Maj. Gen. Frank S. Ross

General Ross served as chief of transportation for the North African invasion.

GENERAL NEWS

Revenue Indices at Peaks in May

Freight index at 236.6 per cent and the passenger figure at 464.2 per cent

Freight and passenger revenue index figures developed by Interstate Commerce Commission's Bureau of Transport Economics and Statistics on the basis of the 1935-1939 monthly averages as 100 were at their peaks in May, according to the latest issue of the Bureau's "Monthly Comment on Transportation Statistics." The May freight revenue index was 236.6, up 4.6 points from last year—or 1.3 points if allowance is made for the fact that there were five Sundays in May, 1943; the passenger revenue index was 464.2.

1944 Earnings Forecast—May's freight revenue at $600,068,677 also marked a new monthly high, while the passenger revenue at $150,075,682 was above that of any previous month this year but was exceeded in some months of 1943. The Bureau calls attention to the fact that the record May freight revenue came after a deduction of "at least $4,790,000" for reserves for possible additional land-grant deductions, the reports on this item not being complete as to six roads. For the first five months of this year, these land-grant reserves totaled $20,000,000.

As in other recent reports, the Bureau has raised data thus far available to a full-year basis, warning again that the calculations "should not be taken as a forecast that the present level of earnings will continue to the end of the year." The calculation produces an estimated 1944 gross revenue figure of $9,520,000,000, compared with $9,055,000,000 in 1943; net railway operating income before federal income taxes of $2,568,000,000, compared with $2,700,000,000; and net income after all taxes of $681,000,000, compared with $874,000,000.

Amortizing War Outlays—Continuing its comment of recent months on the effect of charges to operating expenses for the five-year amortization of defense projects, the Bureau notes that such charges in May amounted to $15,426,742 of which $1,709,330 was for road projects and $13,717,412 for equipment. These charges which began in the latter part of 1941 "averaged $7.6 millions per month in 1942 and $12.1 millions per month in 1943, and have now about reached the maximum," the comment added.

"At the close of 1943," it went on, "the value of equipment which is being amortized under the 5-year plan was $688,845,068 (amortization base). This amount is excluded from the value of the equipment which is being depreciated under regular rates. When the 5-year term is completed, the amortized equipment will presumably be capable of many more years of service, during which neither amortization or depreciation will be charged on it in operating expenses. If we assume a depreciation rate of 3.4 per cent applicable to the $688,845,068, it thus appears that operating expenses will be $23,420,730 smaller per annum for many years after about 1948 than they would be if the 5-year amortization plan had not been in effect. This reduction is over 11 per cent of the amount charged for depreciation of equipment in 1943."

Trend in Accidents—Considerable space is devoted in the statement to a discussion of railway accidents of the 1940-1944 period. There it is pointed out that fewer train accidents were reported in the first four months of this year than in the comparable 1943 period, although the number of locomotive-miles was greater in 1944. Then, however, follows a tabulation of data indicating that "the frequency of train accidents per million locomotive-miles was much higher in the first four months of the years 1942-1944 than in the similar 1940 and 1941 periods."

In this connection it was pointed out that reportable train accidents are those causing damage of more than $150 to railway property; and "the comparability of the train accident totals is affected to some extent by the fact that in a period of advancing prices and wages more of the minor accidents become reportable because of the fixed $150 limit." Among the "significant developments as to casualties," the Bureau lists "the marked annual decline in the number of casualties to trespassers since the depression year 1933"; the fact that "since 1940 the number of casualties to passengers has greatly increased but not in proportion to the passenger-miles"; and the trend of casualties to employees—from 1940 through 1943 they increased "more rapidly than the man-hours, but in the first four months of 1944 the killed and injured rates were nearly the same as in the corresponding period in 1943."

Overtime Eases Off—The Bureau's analysis of employment data reveals that overtime payments "after reaching a high level, have recently shown a tendency to decline."

The highest amount of such payments during the entire war period was the $42,784,529 reported for January, 1944. This was 13.92 per cent of the total compensation paid during the month. The same figure persisted for February, but it was down to 12.34 per cent for March and 12.03 per cent for April. Back in June, 1942, when the upturn started, this percentage relationship of overtime payments to total compensation was 5.63.

Pullman Bows to Separation Decree

Prefers to accept decree as it stands than to chance loss of choice

The board of directors of Pullman, Inc., has decided not to appeal to the Supreme Court from the decree entered on May 8 in the District Court at Philadelphia which directs Pullman, Inc., to separate its car operating and car manufacturing businesses. The decision of the board was made known in a letter to stockholders on July 8 or the day after the termination of the period in which Pullman could file an appeal. According to the decree, Pullman now has 90 days or until October 6 in which to submit a plan of separation.

The Risk in an Appeal—The letter to stockholders said in part, "An appeal from the final judgment in the District Court might appear to be the logical course. However, it is the judgment of your directors that the interest of stockholders of Pullman, Inc., will best be served by not taking an appeal.

"It should be recalled that the District Court refused to accede to the demand of the Department of Justice that Pullman, Inc., be denied freedom of choice and the exercise of its business judgment in effecting the separation, ordered by the decree, of the two major lines of business conducted by the Pullman group of companies. This Court recognized that Pullman, Inc., should have the right to elect whether it would dispose of its manufacturing business or its sleeping car business, and in its decree directed that Pullman, Inc., should have 90 days after the effective date of the decree in which to file with the Court its election as to the business to be disposed of and also to submit at the same time a plan to effectuate such separation. Stockholders will readily understand the difficulties which would be faced in seeking to protect their investments if the management were to be restricted in the manner desired by the government and deprived of flexibility and choice of action in conducting negotiations for disposition of the property and other assets of one or the other of the going businesses now conducted by the subsidiaries of this corporation.

"Your board was obliged to recognize that if an appeal were taken the freedom of choice permitted by the decree would be put in grave jeopardy because the Supreme Court might prefer to adopt the view of the dissenting judge in the Dis-

(*Continued on page 134*)

Rites Commemorate Joseph B. Eastman

I.C.C. ceremony memorializes career of public service; his portrait unveiled

Testimonials to the high esteem in which Commissioner Joseph B. Eastman was held by practitioners before the Interstate Commerce Commission by his fellow members of that body, and by others associated with him in public life, were formally entered upon the permanent record of the commission's deliberations in a memorial ceremony in the commission's large hearing room at Washington, D. C., on July 11. At the conclusion of the session Secretary W. P. Bartel unveiled for the commission a portrait of Mr. Eastman, which is to be placed in the central foyer of the I. C. C. building, along with those of other commissioners whose services have terminated.

The proceedings began when Chairman Patterson recognized Warren H. Wagner, who, as spokesman for the Association of Interstate Commerce Commission Practitioners, introduced the chairman of that organization's committee on memorials, Edward H. DeGroot, Jr., to present a resolution reviewing Mr. Eastman's career and expressing "profound sorrow and deep regret" at his untimely death.

Eulogy Pronounced—Many of Mr. Eastman's written opinions, said this resolution, "are landmarks in the progress of interstate commerce regulation." Of his quarter of a century of service on that body it went on to say, "As a commissioner he was distinguished by hard work, thoroughness, fairness, clarity, and unswerving pursuit of the truth. Wholly free from self-conceit, he had that rarest of virtues, humility. He spared no effort to comprehend, in its entirety, whatever undertaking fell to his lot and to center the full force of his splendid powers upon its successful accomplishment.

"Those men live in history who devote their lives to their fellow man," the resolution continued. "Such a man was Joseph B. Eastman. He rests with those immortal dead who live again in minds made better by their presence."

Daniel W. Knowlton, chief counsel of the commission, then spoke "on behalf of the commission and with gratitude for the privilege," in support of the motion of Mr. DeGroot that the resolution be embodied in the commission's permanent records. Remarking that "Mr. Eastman played his part in the war—a splendid part—and with full knowledge, I believe, that he would be one of the casualties," Mr. Knowlton spoke particularly of the late commissioner's humanitarian qualities, "his friendliness of manner and ready response to friendship offered."

In concluding, the commission's counsel said, "While there was enough of sternness, of iron, in his make-up to give ample assurance of the accomplishment of his high aims, all was tempered by the friendliness of his personality and his warm interest in all with whom he worked or came in contact. On his death Joseph Eastman was acclaimed one of the outstanding public servants of all time and these humanitarian and human qualities, it seems certain, accounted in no small measure for the great success which crowned his efforts; and there is no doubt at all of the part they play in insuring for him the place he holds in our memories."

Praise from Other Sources—In formally receiving into the record these remarks, Chairman Patterson alluded to the resolution adopted by the commission on the day of Mr. Eastman's death, in which these sentiments were expressed:

"The genial and helpful personality of our departed brother, his untiring industry and ceaseless diligence, his great intellectual capacity and breadth of learning, sterling integrity and selflessness, broadmindedness and passion for justice, sound and ripened judgment, and his devotion to the public interest, won the warm affection and abiding regard of all who came into association with him, whether members of the commission and of its staff or persons having business or official relations with him. As public servants we have been inspired by his example of high ideals and splendid achievement, and intimate daily contacts with him have made our lives better. The sudden ending of his career of signal usefulness in fields of great difficulty and responsibility is a tremendous loss to the country which he was serving so well."

The chairman quoted also a laudatory resolution passed by the House committee on interstate and foreign commerce, and to expressions of Senator Wheeler, chairman of the Senate committee on interstate commerce, and of Senator Reed of Kansas, an active member of that committee. Continuing, Mr. Patterson said of Mr. Eastman, "We who were intimately associated with him at the conference table became better acquainted with the man than could those on the outside who were denied this privilege and knew him only through his writings. His geniality, his kindliness toward others regardless of whether or not they agreed with his views, and his ability to explain the most complicated cases simply and clearly, were a source of inspiration and pride to all of us. His abilities were recognized by five successive Presidents of the United States. . . . It was fitting that the President should choose him to be the director of the Office of Defense Transportation and his agent, so that there would not be, as German leaders had predicted, a breakdown in the American transportation system. How well he accomplished that task is universally known."

Fined for Part II Violation

According to advices received by the Interstate Commerce Commission, the New York, Chicago & St. Louis has been fined $4,000 on a plea of *nolo contendere* to a charge of abetting a motor carrier in performing common carrier transportation service without an I. C. C. certificate. The fine was assessed in the federal district court at South Bend, Ind., and the road was required to pay $1,500 of the amount imposed.

Federal Usurpation of Waters Deplored

U. S. Chamber wants states and private business to share in their development

Policy declarations on the use and development of the national water resources have been adopted in a referendum by the membership of the Chamber of Commerce of the United States, thus giving effect to the proposals of that organization's Natural Resources Department Committee. Comparable statements of policy on other transportation questions recently have been formulated by the chamber, as reported in *Railway Age* of April 1, page 654, and July 8, page 97.

Navigation Not the Only River Use—Emphasis was put upon "full opportunity for private enterprise" and recognition of the interests of the states in the 10-point program of water resource policies thus adopted. While the use of natural and "improved" waterways for navigation was subordinated, in these expressions of policy, to other aspects of the question of postwar development of water resources, the declarations adopted did incorporate an observation that "authorization and construction of navigation works and improvements" should be limited to those "which can be operated consistently with the fullest use of the waters of such rivers for all purposes."

In this form the committee's statement of policy, subsequently approved by the membership, apparently represented a compromise on a proposed basic principle with regard to statutory recognition of the preference that should be shown as to the use of the water. Under this principle a formula for priority of use would have been recommended for "federal recognition," with domestic use of water outranking all others, and hydroelectric power and navigation taking the least important place "for the obvious reason that substitutes are readily available for both of these uses." The declaration embracing this "rigid formula" was modified after consideration of a minority report (prepared by Thomas J. Strickler of Kansas City, Mo.), however, and the committee offered for the approval of the membership instead its more general statement on consistency of use, noted above.

Navigation vs. Irrigation—The same minority report disclosed the existence of a sharp difference of opinion within the committee as to the desirability of the further development for navigation of the lower Missouri river. One opinion on this question held that navigation requirements on the lower Missouri are creating conditions adverse to irrigation on the upper river and to the operation of the government power plant at Fort Peck, Mont., and that "it is unthinkable that in these days of truck and train the more vital uses of water for other purposes should be surrendered, or in any way abridged, to satisfy a navigation use when

the water is so desperately needed for other purposes." The contrary view was that the Fort Peck dam was constructed for navigation, the operation of the power plant being only a secondary purpose, and that there is adequate water authorized for navigation on the lower river without creating conditions adverse to irrigation above, whence it was concluded that the question at issue had already been settled, and now has come up again only through an effort of "irrigation interests" to subordinate the original objective of the Fort Peck development.

Recognizing that recent federal participation in water resource development, including reservoir construction as a part of navigation improvement and flood control, have projected the federal government into water courses far above the reaches formerly recognized as navigable in fact, the committee, in its report submitted to the membership, made no specific observations on this controversy over priority of rights to the use of water, but expressed instead the view that "Congress in authorizing navigation and flood control projects should consider more fully and give recognition to the rights of states in the use of water resources," and emphasized the conclusion that Congress should "exercise great care lest it promote and extend navigation improvements in such a manner as to defeat other water uses, and often promote the interests of one state or group of states against the interest of another state or group of states."

(Another indication of the existence of such differences of opinion as to the proper use of river waters in the more arid sections of the country was noted in *Railway Age* of June 10, page 1122, where minority proposals of Senator Robertson, Republican of Wyoming, to the Senate commerce committee with respect to the current rivers and harbors bill to bring about participation of the states in studies of waterway projects in the West were referred to.)

Federal Products Shouldn't Be Given Away—While thus treating the question of development of rivers for navigation, the chamber committee's policy recommendations were relatively specific in dealing with the federal government's place in the exploitation of water resources, and with so-called regional authority plans, such as that of the Tennessee Valley Authority. Thus its proposal that full opportunity be afforded private enterprise in water resource developments went on to extend that policy to the private purchase and resale of products, goods or services, including power, that result from projects developed by the government, and to insist that government sale of such products, if also made and sold by citizens, be "at prices sufficient to cover all costs and the same burden of taxes—both in respect to ad valorem, excise and income taxes—as citizens pay."

Congress was urged to regain the control of water resource development that "it has lost to administrative agencies," and was particularly advised not to depend on the commerce clause of the Constitution to limit water uses established by the states. Other recommendations dealt with re-estimation of the cost of all projects under consideration to give effect to current or postwar conditions; with coordinated planning of projects, such as flood control measures, that may affect other projects and "other lines of endeavor"; with the desirability of regional power pools; with allocation of reclamation projects to the Bureau of Reclamation and of flood control and navigation proposals to the Army; and with curbing the spread of the regional authority plans. In conclusion, the chamber was put on record in favor of "the development of the water resources of the nation for the greatest benefit of the nation as a whole and to the people in the territory in which they are located, upon sound, constructive and forward-looking engineering and economic policies free of politics and on a non-partisan basis."

R. F. & P. Gets National Security Award

The Richmond, Fredericksburg & Potomac recently received a "National Security Award" from the Office of Civilian Defense in recognition of "the maintenance of a superior standard of protection and security." The certificate presented to the company further states that "effective joint efforts to safeguard production, employees, and property, have made possible this achievement, which stands as a mark of distinction in the nation's war effort."

In presenting the award, the Virginia office of the O. C. D. called attention to the special significance of excellent protective measures on the R. F. & P. because of the heavy war traffic dependent upon the services of this carrier." The R. F. & P. is said to be the only entire railroad which has been so honored and is reported to have "one of the most complete civilian defense organizations to be found anywhere."

The railroad's civilian defense organization functions under President Norman Call as director, with E. M. Hastings, chief engineer, being the deputy director in active charge.

New O. D. T. Truck Operations Director Named

The Office of Defense Transportation has announced the appointment of Ellis T. Longenecker of Los Angeles, Calif., as division director of property operations of the O. D. T. Highway Transport Department, succeeding H. C. Arnot, whose resignation was reported in *Railway Age* of June 24, page 1227.

Mr. Longenecker joined the O. D. T. staff in March, 1942, and at the time of his most recent promotion was chief of the For-Hire Carrier Section of the Highway Transport Department. He came to the O. D. T. after having been for about six years a district supervisor of the Bureau of Motor Carriers of the Interstate Commerce Commission, which work he took up after a varied experience with truck operators.

Another recent appointment in the Highway Transport Department is that of Harold N. Smith, who has been named assistant chief of the Private Carrier Section, succeeding A. Henry Walter. A former factory representative for the Goodyear Tire & Rubber Company, Mr. Smith first came to O. D. T. in September, 1942, and was assistant regional director at San Francisco, Calif., when he left in April, 1943, to enter the army. He returned to O. D. T. last March.

Railroads Agree to Pay New Jersey Tax Debt

On July 10, legal representatives of major railroads in New Jersey, in conference with Attorney General Walter D. Van Riper, agreed to full payment of the estimated $60,000,000 owed the state in delinquent taxes and interest. The accord resulted from the recent decision of the state court of errors and appeals outlawing the 1941 and 1942 railroad tax compromise legislation which waived interest payments totaling $24,000,000 on back taxes assessed against the railroads and permitted the payment of $34,000,000 of principal amount in installments.

Under the outlawed legislation, about $19,000,000 was presented in tax payments by the railroads, which a court order prevented the state from accepting pending the outcome of a test of the law's constitutionality, and arrangements have now been made to release about $15,000,000 of this sum. The remaining $4,000,000 was offered by the Central of New Jersey and the New York, Susquehanna & Western, both in bankruptcy and controlled by federal courts, which railroads have informed the Attorney General that they are unable to make payments immediately or to apply the $4,000,000 to their indebtedness.

McNear Seeks Injunction to Halt T. P. & W. Outlays

A suit, seeking the return of the Toledo, Peoria & Western to its owners and an injunction preventing the Federal manager from making additions and betterments and charging them against the railroad company, has been filed in the Circuit Court of McDonough county at Macomb, Ill., by George P. McNear, Jr., president of the railroad. Holly Stover, federal manager and George Voelkner, general manager, are named as defendants.

The complaint contends that when the War Department seized the railroads, including the T. P. & W., and returned them to their owners on January 18, the T. P. & W. should have been returned to its owners rather than to the federal manager. The complaint contends that executive order 9108, under which the T. P. & W. was seized, was of no further effect after the Secretary of War took possession of the T. P. & W. and that he was not authorized by law to return the road to the federal manager.

The suit also charges that expenditures of $221,152 made by the federal manager from May 22, 1942 to December 31, 1943 for additions and betterments and charged against the plaintiff were made without the authority or knowledge of the plaintiff and should be paid for by the defendants. It

states that the defendants made additions and betterments that the company's officers considered ill-advised and propose to spend $514,682 on other additions and betterments in 1944 and to pay 76 per cent of the amount with the plaintiff's funds. The complaint attempts to show that some of the proposed work would be "pure waste and folly" and asserts that the defendants under the executive order were not authorized to make additions and betterments. It further contends that executive order No. 9108 was unlawful because it made no provision "for the payment of just compensation."

May Accident Statistics

The Interstate Commerce Commission on July 11 made public its Bureau of Transport Economics and Statistics' preliminary summary of steam railway accidents for May and this year's first five months. The compilation, which is subject to revision, follows:

Item	Month of May		5 months ended with May	
	1944	1943	1944	1943
Number of train accidents*	11,425	1,233	6,940	6,928
Number of casualties in train, train-service and nontrain accidents:				
Trespassers:				
Killed	156	166	572	636
Injured	110	146	451	562
Passengers on trains:				
(a) In train accidents*				
Killed	....	12	7	16
Injured	41	443	508	1,136
(b) In train-service accidents				
Killed	5	6	23	21
Injured	234	227	1,119	1,031
Travelers not on trains:				
Killed	3	2	8	7
Injured	64	74	438	463
Employees on duty:				
Killed	90	74	452	399
Injured	3,868	3,462	18,828	18,041
All other nontrespassers:**				
Killed	111	129	866	858
Injured	454	525	2,904	2,889
Total — All classes of persons:				
Killed	365	389	1,928	1,937
Injured	4,771	4,877	24,248	24,122

* Train accidents (mostly collisions and derailments) are distinguished from train-service accidents by the fact that the former cause damage of more than $150 to railway property.

** Casualties to "Other nontrespassers" happen chiefly at highway grade crossings. Total highway grade-crossing casualties *for all classes of persons, including both trespassers and nontrespassers,* were as follows:

Persons:				
Killed	96	117	778	747
Injured	233	320	1,729	1,752

Seaboard Conducts End-to-End Radio Tests

A test run, July 8, employing radio communication between head-end and rear-end of a freight train, was conducted by the Seaboard Air Line from Richmond, Va., to Miami, Fla.

Announcing "pleasing results," J. R. DePriest, superintendent telegraph and signals, declared that "in conducting the present test between engine and caboose, the Seaboard is looking into the possibilities of providing radio communication over its entire system, not only for the dispatching of trains, but also for such other purposes as may be practicable and desirable."

A special type of radio receiving and transmitting unit, developed by the Radio Division of Bendix Aviation Corporation, was used. The equipment, composed of very high frequency, multi-channel radios, consisted of two similar installations, each containing a transmitter, receiver and power unit in a single compact case. One installation was mounted on the engine, the other in the caboose. A handset, similar to the telephone, was supplied, and both engine and caboose had loud speakers.

Mr. DePriest suggested benefits which might be expected through the use of radio, among them a saving of time and resultant shortening of overall train schedules. This would result from such instances as a flagman being called back to his train after the train has completed a stop and is ready to proceed. The flagman, through the use of radio, could immediately report to the engineer when he was aboard, rather than relying upon hand signals, as at present.

In addition, he pointed out, when conditions necessitate the stopping of a train because of some mechanical difficulties, the conductor could quickly have the engineer make the stop in a normal manner, rather than apply the brakes from the caboose, with the possibility of damaging equipment.

"Many other uses of radio come to mind," Mr. DePriest concluded. "For instance, in getting trains into sidings, spotting cars, making up trains in yards, yard control of switch engines, etc."

Canadian House Battles Over C. P. R. in Post-War Aviation

After charging in the House of Commons at Ottawa, July 7, that the Canadian Pacific and the Conservative press had united in attacking his post-war civil aviation policy, Munitions Minister Clarence Howe accepted two amendments to his bill to set up an air transport board. One of the amendments would make the decisions of the proposed air transport board subject to appeal to the Supreme Court of Canada. Under the other amendment accepted the chairman of the board would hold office for 10 years, one member for seven, and the third member four.

Sharp exception was taken to Mr. Howe's statement about a "storm of propaganda" in the Conservative press on the post-war civil aviation program.

"I do not think it can be described as indulging in a storm of propaganda when it criticizes the provisions of this bill," said Mr. Hazen.

Discussing the policy of divorcing air services from railways earlier, Mr. Howe said that members could see the "railroad propaganda machine" in action. He said that "when the railroad propaganda machine rolls, every Board of Trade and the Canadian Manufacturers' Association snap into line quickly."

"If honorable members," the minister declared, "want to see a railway propaganda machine in action let them look about today. Every Conservative paper has carried the statement that this is a personal matter with Mr. Howe, that his colleagues are not in agreement with him. I deny it absolutely." He declared he had the full support of his cabinet colleagues in the legislation.

Meeting persistent questioning from opposition members about the question of jurisdiction and whether or not the minister regarded the federal authority supreme, Mr. Howe took care not to slam the door against the ownership and operation of air lines within a province.

Mr. Howe pointed to the division of civil aviation between TCA and the Canadian Pacific Airlines, and he declared that applications had been filed by the Canadian Pacific Company "for every route that has been opened or suggested in Canada."

June Employment 4.6 Per Cent Above June, 1943

Railroad employment increased another 1.52 per cent—from 1,425,192 to 1,446,860—during the one-month period from mid-May to mid-June, and the June total was 4.6 per cent above the comparable 1943 figure, according to the latest summary of preliminary reports prepared by the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission. The index number, based on the 1935-1939 average and adjusted for seasonal variation, was 139.9 for June, showing a fractional decrease from May, when it was 140.2. The June, 1943, index was 133.7, the increase in the 12-month period being 6.2 per cent of the base average.

Employment in June was greater than in May in all groups except train and engine service and the yardmasters, switchtenders and hostlers category, in which the declines were, respectively, 0.10 and 2.59 per cent. Increases were shown in these groups as compared to June, 1943, however. The largest increase in this June, over May, was 5.16 per cent in the maintenance of way and structures group. Transportation, other than train, engine and yard, increased 1.41 per cent, while the remaining groups reported fractional increases. The increases indicated over the 12-month period ended in mid-June ranged from 1.03 per cent in the train and engine service category up to 7.55 per cent in the maintenance of way and structures group.

H. H. Schwartz Named Chairman of Railway Labor Panel

President Roosevelt on July 7 named Harry H. Schwartz a member and chairman of the National Railway Labor Panel to succeed Dr. William M. Leiserson, whose resignation from this post accompanied his resignation from the chairmanship of the National Mediation Board, in which position he also was succeeded by Mr. Schwartz.

R. F. Cole Again Secretary of Mediation Board

Robert F. Cole returned to the secretaryship of the National Mediation Board on July 1, succeeding Thomas E. Bickers, who had served since June 1, 1943, when Mr. Cole was transferred at his own request to a senior mediator's position. Mr. Cole's previous service as secretary covered five years.

The organization change came about as a result of a report by Mr. Bickers, who requested that he be transferred to field service and recommended that field headquarters for senior mediators be abol-

ished in view of the board's limited appropriation for the coming fiscal year and the large volume of cases with which it is now confronted. The recommendation has been put into effect, closing the field headquarters at New York, Chicago, Detroit, Mich., St. Louis, Mo., Houston, Tex., and San Francisco, Calif.

Freight Car Loading

Loadings of revenue freight for the week ended July 8 (which included the July 4 holiday) totaled 745,141 cars, the Association of American Railroads announced on July 13. This was a decrease of 152,659 cars or 17.0 per cent below the preceding week, a decrease of 63,489 cars or 7.9 per cent below the corresponding week last year, and a decrease of 110,017 cars or 12.9 per cent below the comparable 1942 week, which did not, however, include July 4.

Loading of revenue freight for the week ended July 1 totaled 897,800 cars, and the summary for that week as compiled by the Car Service Division, A. A. R., follows:

Revenue Freight Car Loading

For the Week Ended Saturday, July 1			
District	1944	1943	1942
Eastern	164,047	162,895	141,152
Allegheny	200,356	170,936	165,698
Pocahontas	53,484	55,638	36,432
Southern	122,599	114,392	108,595
Northwestern ..	134,666	142,744	125,439
Central Western	145,058	131,515	114,412
Southwestern ..	77,590	73,962	62,012
Total Western Districts	357,314	348,221	301,863
Total All Roads	897,800	852,082	753,740
Commodities			
Grain and grain products	58,600	60,479	42,342
Live stock	13,950	11,757	9,515
Coal	175,440	145,178	120,297
Coke	14,331	12,856	12,578
Forest products.	50,004	44,614	44,431
Ore	80,971	89,692	85,947
Merchandise l.c.l.	106,831	100,596	82,044
Miscellaneous ..	397,633	386,910	356,586
July 1	897,800	852,082	753,740
June 24	881,267	760,930	853,418
June 17	879,161	868,286	844,913
June 10	874,193	854,486	832,635
June 3	810,772	667,609	854,689
Cumulative Total, 27 Weeks ..	21,949,194	20,952,550	21,817,141

In Canada.—Carloadings for the week ended July 1 totaled 63,539 as compared with 72,677 for the previous week (the holiday, July 1, being the main factor in the decrease), and 62,599 for the corresponding period last year, according to the Dominion Bureau of Statistics.

Total for Canada	Total Cars Loaded	Total Cars Rec'd from Connections
July 1, 1944	63,539	36,783
June 24, 1944 ..	72,677	38,835
June 17, 1944 ..	71,999	37,151
July 3, 1943	62,599	38,978
Cumulative Totals for Canada		
July 1, 1944....	1,791,068	1,021,917
July 3, 1943....	1,649,053	1,025,044
July 4, 1942....	1,650,327	850,364

Extends Time on K. C. S. Block Signal Installations

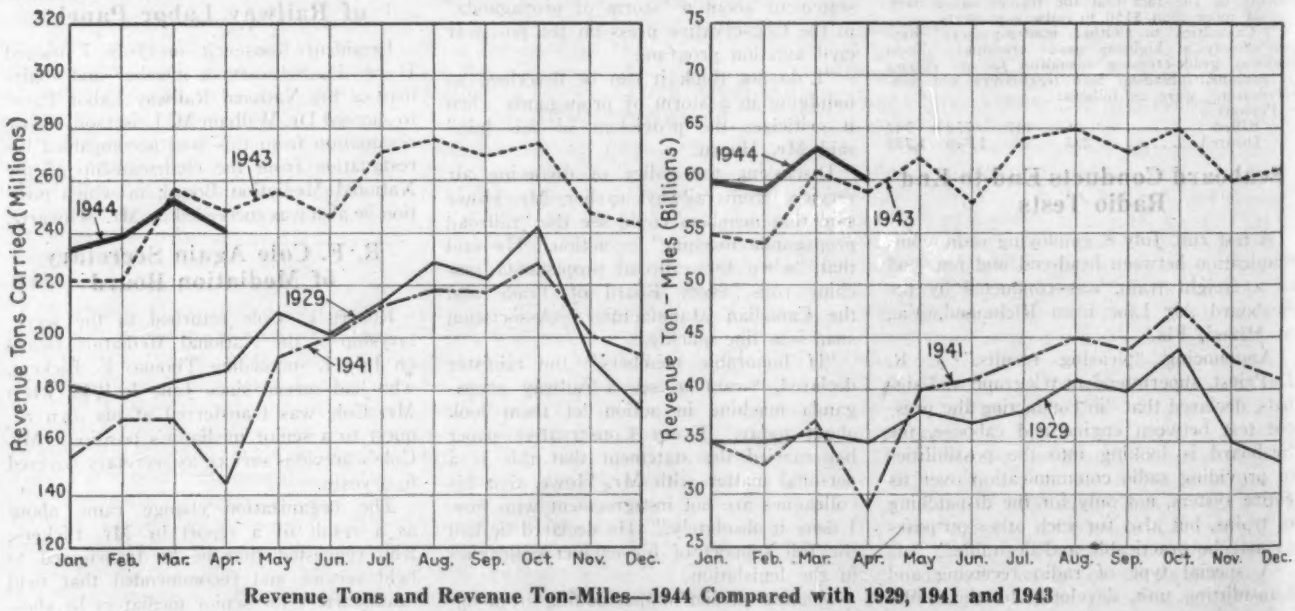
The time within which the Kansas City Southern is required, under order of Division 3 of the Interstate Commerce Commission, to install a block signal system on its line between DeQuincy, La., and Beaumont, Tex., about 37 miles, and between Joplin, Mo., and McElhany, 26.5 miles, has been extended six months to December 31 of this year by order of Chairman Patterson. As noted in *Railway Age* of January 9, 1943, page 179, this order was issued in connection with a standing show-cause order which would require installation of block signals on all portions of the main line of the road, and proceedings with respect to those portions of the line not affected by the installation order remain open for further consideration.

Lack of Help Slows Wheat Flow

The largest wheat crop on record for the United States, which is now in the peak of harvest, is being stored on the ground because, due to manpower shortage, cars cannot be unloaded at elevators. The movement of the wheat crop this year has been complicated by a number of factors. The Illinois and Indiana crops have matured earlier than usual and the Nebraska crop later, with the result that their movements have coincided with that from Kansas. In addition, the box car supply has been greatly depleted as a result of shipments of large amounts of ammunition to the fronts. However, the shortage of cars for grain is not a major factor because the lack of labor for unloading regulates the movement. Even if adequate cars were available for loading the crop, they could not be unloaded and would serve only as storage space, glut the markets and deprive other traffic of transportation.

Permit System—The seriousness of the conditions confronting the movement of grain this year was recognized by the railroads, the Interstate Commerce Commission, and the Office of Defense Transportation, with the result that action was taken before the movement started. The O. D. T. issued an order that no cars are to be used for storage and the I. C. C. and the railroads placed a permit system in effect whereby, in the event that loaded cars threaten to accumulate at unloading points, no grain will be loaded for such destinations unless the shipper has a permit from the I. C. C. Further action was taken when the O. D. T. called a meeting of railroads, shippers, elevator operators and other grain interests at Kansas City on July 12 to gage the unloading ability of markets and set up a plan for a controlled movement from the fields.

The unloading situation became acute in the last few days of June and the first market to be placed under the permit system was Enid, Okla., on July 1. It was followed by Ft. Worth, Tex., on July 4; Toledo, Ohio; Fostoria, and Cincinnati on July 5; Columbus, Ohio, on July 6; Kansas City, Mo., and Louisville, Ky., on July 10 and Chicago on July 11. At Kansas City, receipts set a record for the season, with 2,280 cars of wheat received on July 10. These receipts brought the backlog of cars awaiting unloading to 4,800 with the shortage of help limiting unloading to 900 cars a day. At Ft. Worth, the backlog has been about 900 cars, but increased on July 10 and 11 when prisoners of war from Mineral Wells refused to unload cars. On July 11, elevators at Chicago and Columbus were filled while those at Indianapolis, which usually handle some of the Kansas



Revenue Tons and Revenue Ton-Miles—1944 Compared with 1929, 1941 and 1943

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LIMA POWER

HAS STAYING POWER

No single factor has been more responsible for the outstanding wartime record made by American Railroads than locomotive utilization. As "Railway Age" reports, ". . . . It is a far cry from two decades ago, when locomotives were changed at every operating division, to the present-day practice, when they operate efficiently and effectively over several divisions, with changes in the engine crews."

Under conditions such as these the "staying power" of Lima-built locomotives has been proved conclusively.

LIMA LOCOMOTIVE WORKS — LIMA LOCOMOTIVE WORKS INCORPORATED — INCORPORATED, LIMA, OHIO

crop, were having some difficulty taking care of wheat from Indiana.

Northwest Crop Coming Along Too—The Atchison, Topeka & Santa Fe reports that its wheat loadings have been about 1300 cars a day and that if markets cannot absorb the wheat, shipments will be cut to 700 cars a day. The Chicago, Rock Island & Pacific reports that present loadings are about twice those of last year. On July 10 they totalled 770 cars, compared with 495 a year ago. On July 3, Rock Island loadings amounted to 982 cars. Its Oklahoma division has handled 6,329 cars and its Panhandle division, where some elevators were closed for a short period, 2,610 cars so far this year.

While attention is being given the movement of the wheat crop in Kansas, Nebraska, Illinois and Indiana, the fast ripening crop of wheat in Montana, North Dakota, South Dakota and Minnesota threatens to demand immediate attention. It is anticipated that it will be necessary to start moving wheat from this section within a week.

O. D. T. Tells Truckers to Care for Tires and Vehicles

Truckers have been warned by the Office of Defense Transportation that the manner in which they operate and maintain equipment in conformity with good practice may be a factor in determining whether or not they are entitled to new equipment. It was said that there continues to be evidence that many trucks and truck tires are being abused and prematurely worn out by some truckers, even though many others are doing a very good job in conserving their equipment, and the O D. T. was reported to have under consideration a plan to inspect old trucks to be replaced before allocating new equipment under the procedure set up this month, in order to determine if proper conservation practices have been followed.

L. & N. Troop Train Derailed

Nineteen or more soldiers were killed and about 150 were injured when a troop train of 12 sleeping cars and 4 kitchen-baggage cars southbound from Corbin, Ky., on the Louisville & Nashville, was derailed one mile south of Highcliff, Tenn., at 9 p. m. on July 6. The engineman and fireman were fatally injured. While the cause of the accident had not been determined at the time of going to press, representatives of the Federal Bureau of Investigation and Army Intelligence were investigating the possibility of sabotage. Of the 16 cars in the train, 12 did not leave the rails. The locomotive and four cars fell into Clear Fork Creek, the locomotive resting in four feet of water, with the four passenger cars turning over on the side-hill to the right of the main line.

The line on which the accident occurred extends from Cincinnati to Atlanta and is of modern construction. It is protected by automatic block signals and all locomotives operating in that section are equipped with automatic train control devices. The curve on which the derailment occurred is protected with inside guard rails, while the track is protected on the hill-side against falling rock by a detector fence which is directly connected with the block signal system.

According to the railroad, the topography of the country where the derailment occurred is extremely rugged and a more favorable location for committing an act of sabotage could not have been selected by persons with such intentions. This is the first time since December 20, 1917, in which a passenger has been killed in an L. & N. train accident.

To Consider Charges for Unloading Livestock at Cleveland

The Interstate Commerce Commission has reopened its No. 28421 proceedings, dealing with the provision of loading and unloading services at the Cleveland, Ohio, stockyards, for further consideration of the reasonableness of charges for such services, on and after June 19. This action was taken upon the joint petition of the railroads serving Cleveland and the Livestock Terminal Service Co., operator of the facilities, following an order of Division 4 of the commission which authorized the service company to abandon such operations but required either the railroads or the Cleveland Union Stock Yards Co. to continue the service. As noted in *Railway Age* of June 24, page 1222, the petition indicated an agreement between the parties to the controversy over this operation to endeavor to work out a satisfactory arrangement for unloading livestock at this point.

"Train Talks" Tells Story of 15 Years' Research

The Pennsylvania reports that in the last fifteen years it has spent nearly a billion dollars on improvements, and that in the last five years alone, more than $300,000,000 has gone into betterment expenditures. This is the disclosure made in "Train Talks" for June, an informal review of the railroad's research activities which is now being distributed to passengers and shippers. "Progress in the art of railroad transportation throughout the development of the industry," it is pointed out, "has been inspired by the fruits of research."

Building a Turbine Locomotive—It is announced that a new type of direct-drive steam-turbine locomotive of greatly increased power is now being built, and that, in addition, an initial order has been placed for the construction of new type multi-cylinder steam freight locomotives for hauling heavy trains at a faster rate of speed.

Much of this research, states the booklet, is carried on at the Altoona Works of the railroad (established in 1874), where at a cost of $1,500,000 a year, an extensive department specializes in laboratory research and testing designs and materials. The department personnel totals 275, including a technical staff of 62.

The review informs non-technical readers that among the many highly specialized products of research in use on the railroad is the "cab signal," an outcome of sustained experiments in the field of electronics.

In a form "still experimental" is the electronic train telephone (described in the *Railway Age* of February 12, page 352), which permits verbal communication between the ends of moving trains, between trains, and between trains and wayside towers. It is explained that this is now being tried out, "with very favorable results," on the Belvidere-Delaware Branch, extending 67 miles northward from Trenton, N. J.

Track and Bridge Tests—The reader is reminded that while most research is done in the laboratories and test plant, some has been carried out on the railroad under conditions of actual operation. Notable are the track, locomotive and bridge tests, at Claymont, Del. (*Railway Age*, April 4, 1936, page 570), and Elkton, Md. It is stated the Claymont tests determined the extent and causes of stresses produced in the track by electric engines running at high speed, and led to the design, and subsequent improvement of the GG-1 locomotive now used in the railroad's electrified high-speed passenger and freight service.

The Elkton tests "demolished beliefs which had been held for years as to the highest locomotive speeds permissible on bridges without creating harmful stresses in the structures. In consequence, speed limits over bridges were materially raised, contributing in an important degree to the quickening of schedules that followed electrification between New York, Philadelphia, Baltimore, Washington and Harrisburg."

The pamphlet suggests that while "air conditioning, streamlining, and the introduction of new luxuries and beauties in car interiors and appointments" were interrupted by the war, they will be resumed as soon as materials and trained hands are again available.

Employees Express Themselves in Perfect Shipping Contest

Perfect shipping means the protection of railroad business and employee jobs, according to employees of the Chicago, Milwaukee, St. Paul & Pacific who submitted letters on the subject in a contest conducted by the railroad in April coincident with the perfect shipping campaign of the shippers advisory boards and the railroads. In the Milwaukee contest, four $25 war bonds were given for the best letters on the subject of loss prevention and 10 prizes of $10 each in war stamps were given for the best suggestions for prevention.

"For the money a railroad pays its employees in wages and salaries," an agent wrote, "it gets their service; for the money the railroad spends for fuel it gets steam to drive its locomotives which haul the tonnage; but for the money paid out in claims it gets nothing but criticism from the consignee, loss of his goodwill and sooner or later his business. When the business is lost, the earnings on which our pay checks depend are lost."

"We have something to offer the public," a fireman wrote. "We can give it the same high quality of service we gave it during the depression. Possibly we can't handle the business as fast as we did because of the demands of war but we can still serve the public. The war is not an excuse for neglecting the customer but affords the rail-

News Department continued on next left-hand page

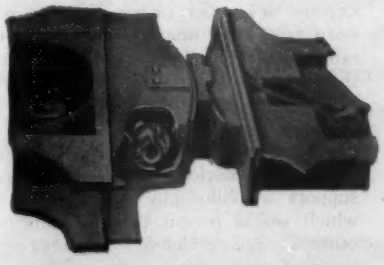
★ ★

RALPH P. JOHNSON

Chief Engineer, The Baldwin Locomotive Works

in his book on* THE STEAM LOCOMOTIVE *states:

"WITH certain types of radial buffers, properly maintained, between engine and tender, the tender properly becomes part of the locomotive mass. While no account is taken of this in counter-balance calculations, it provides a factor of safety for the absorption of the inertia effects of the reciprocating parts."



THE Franklin E-2 Buffer meets this requirement, and also provides free flexibility between engine and tender to compensate for curves and turnouts.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK • CHICAGO

In Canada: FRANKLIN RAILWAY SUPPLY COMPANY, LIMITED, MONTREAL

road an opportunity we serve him while others forget him."

"Under the handicap of labor shortage," a rate clerk wrote, "it is the duty of experienced truckers, stowers and checkers of freight to keep an eye on the inexperienced men and teach them the correct and safe way of handling freight. Individuals making occasional shipments of freight or household goods sometimes have little knowledge of proper packing and when information is volunteered, it is appreciated and followed, with the result that loss and damage are prevented."

"For the past 13 years I have prevented a number of claims by inspecting livestock when it is loaded," another employee wrote. "While it is not the duty of the conductor or brakeman to do so, I feel it is his duty to look after the interest of his employer. On one occasion I contested the number of hogs loaded into a car because my count of 49 was 15 short of the 64 to be loaded and found that the loaders had forgotten 15."

"Much could be accomplished toward preventing claims," an agent wrote, "if photographs of actual conditions were shown to persons connected with the shipping and handling of freight. We publish good looking pictures in our magazines but the only time we see anything about claim prevention is when Perfect Shipping Month rolls around."

Practitioners Move to Provide Eastman Memorial

A special committee of the Association of Interstate Commerce Commission Practitioners is following through on the Executive Committee's recent decision to collect a fund for the purpose of having a bust of the late Commissioner Joseph B. Eastman placed in the rotunda outside the commission's large hearing room, across from the bust of Judge Cooley which was also presented to the commission by the association.

The fund will be collected from members of the association "and other friends and admirers of Mr. Eastman who may desire to contribute," and the special committee's letter soliciting subscriptions has been sent out on that basis. Names of contributors will be presented to the commission at the time the bust is presented. Charles E. Bell, treasurer of the association, heads the special committee.

Whittemore Suggests Self-Reliance to Vermonters

Representing the railroad industry, which he explained "is more closely attuned to general business conditions than almost any other industry," L. F. Whittemore, assistant to president, Boston & Maine, told the Rotary Club, at Barre, Vt., July 12, that when the war emergency is over, northern New England "is going to have a large volume of workers, skilled in the various metal trades who can find employment only if someone will put up the money to continue such industries." Those who put up this money to continue existing industries or start new ones will need to "have a great deal of courage," he believes, explaining that "from where I sit, it looks as if the Department of Justice in their zeal to enforce the Sherman Anti-Trust Law has gone far beyond the purpose of the law and is trying to discourage ownership in industry as a step toward the socialization of our basic economy." Reliance on government subsidy, he pointed out, "is the sugar-coating which encloses the pill of dictatorship which leads to the loss of individual freedom."

It is his view that northern New England can attract branch factories of some of the "great industries" now concentrated in Detroit, Akron, Cleveland and parts of the south. Northern New England, said Mr. Whittemore, "will never lift itself by its bootstraps by depending on government subsidy," adding that the fact that the rest of the country has "gone so far down this road" adds strength to New England's position.

If there is business prosperity in northern New England, he concluded, the railroads will have a "fair chance of prosperity."

Representation of Employees

The Brotherhood of Maintenance of Way Employees and the Brotherhood of Railroad Signalmen of America have won recent elections certified by the National Mediation Board, thus supplanting the Western Maryland Maintenance of Way Association, Inc., as Railway Labor Act representative of Western Maryland maintenance of way employees, and signal department employees, including testmen, assistant testmen, relay repairmen, signal maintainers, assistant signal maintainers, signal linemen, and groundmen.

Would Ease Mixed-Carload Rules in West

Examiner Claude A. Rice has recommended in a proposed report that the Interstate Commerce Commission require the railroads to liberalize westbound classification rule No. 10 and the corresponding rules in westbound transcontinental tariffs and westbound tariffs of rates to Montana, pertaining to freight in mixed carloads. The proposed report is in No. 28989, involving the complaint of the Illinois Territory Industrial Traffic League which was supported by the Secretary of War and various other intervenors, but opposed by many other intervenors.

Under the assailed rules, when alternative rates are not involved, transportation charges on a mixed carload shipment are based on the straight carload rate applicable to the highest rated article in the car, and on the highest minimum weight applying to any article in the car. In recommending that the foregoing be found unreasonable, the examiner would not have the commission go as far in the way of liberalization as the complainants ask. He would prescribe a future rule to provide:

(1) That transportation charges shall be determined by applying to the actual weight of each article in a mixed carload the rate on a straight carload thereof, subject to minimum hereinafter noted; (2) that if a commodity in a mixed carload is subject to alternative straight carload rates and minimum weights the rate charged shall not be lower than the rate which would apply if the same quantity of that commodity were shipped as a straight carload; (3) that arbitraries shall be added to compensate the carriers for the expense involved in rate checking, billing, and test-weighing of mixed carloads, the arbitrary to be $1 on each mixed-carload shipment on which it is necessary to apply not more than 5 rates, $2 if more than 5, $3 if more than 10, $4 if more than 15, and so on; and (4) that the minimum transportation charge on each item enumerated in the bill of lading of a mixed-carload shipment shall be the straight carload rate per 100 pounds. The practice of charging for a deficit in carload minimum weight the carload rate applicable to the highest rated article in the shipment should be continued.

Pullman Bows to Separation Decree

(*Continued from page 128*)

trict Court who was of the opinion that no such freedom of choice should be permitted. To safeguard this essential freedom, your directors believe that the decision not to appeal is for this reason in the best interests of the corporation, its stockholders and its employees."

Would Prolong Uncertainty—"Moreover the taking of an appeal would necessarily have prolonged a period of legal uncertainty and would have left the railroad users of sleeping-car service and the railroad buyers, who have been accustomed to look to Pullman-Standard for supplies of both freight and passenger equipment, hampered in their dealings with the Pullman group of companies, both in the immediate future and in the long-range planning of the railroads for the improved railway services which they intend to give to America.

"Your board is conscious that the uncertainties which confront all other parties at interest in this forced disintegration of the Pullman organization are also of real concern to thousands of employees. Although it is unthinkable that employees of long training and specialized experience will not find continuation of their employment under any plan of separation, we feel that prolonged delay, as the result of appeal litigation, in clearing their future employment status might prove to be a deterrent to all-out effort in the important wartime activities in which they are now engaged."

Post-War Policy Should Serve Shippers and Consumers

A national transportation policy for the post-war period must be designed solely in the best interests of shippers and consumers of the country, and not for the purpose of promoting one mode of transport at the expense of another, or to perpetuate government favors for one and deny them to another, according to Donald D. Conn, executive vice-president of the Transportation Association of America, before a forum luncheon of the Tulsa Chamber of Commerce on July 6. "The great petroleum producers of America have common cause to support a philosophy of national policy which would permit the railroads or any other form of carrier to own and operate all types of transportation facilities," he said. "The distribution mechanisms of the oil industry have been built up under the principle of common ownership in the field of private transportation. These great producers own and operate tankers on the oceans, tank barges on the rivers, trucks on the highways, privately-owned carlines operating over the railroads, and pipelines. They

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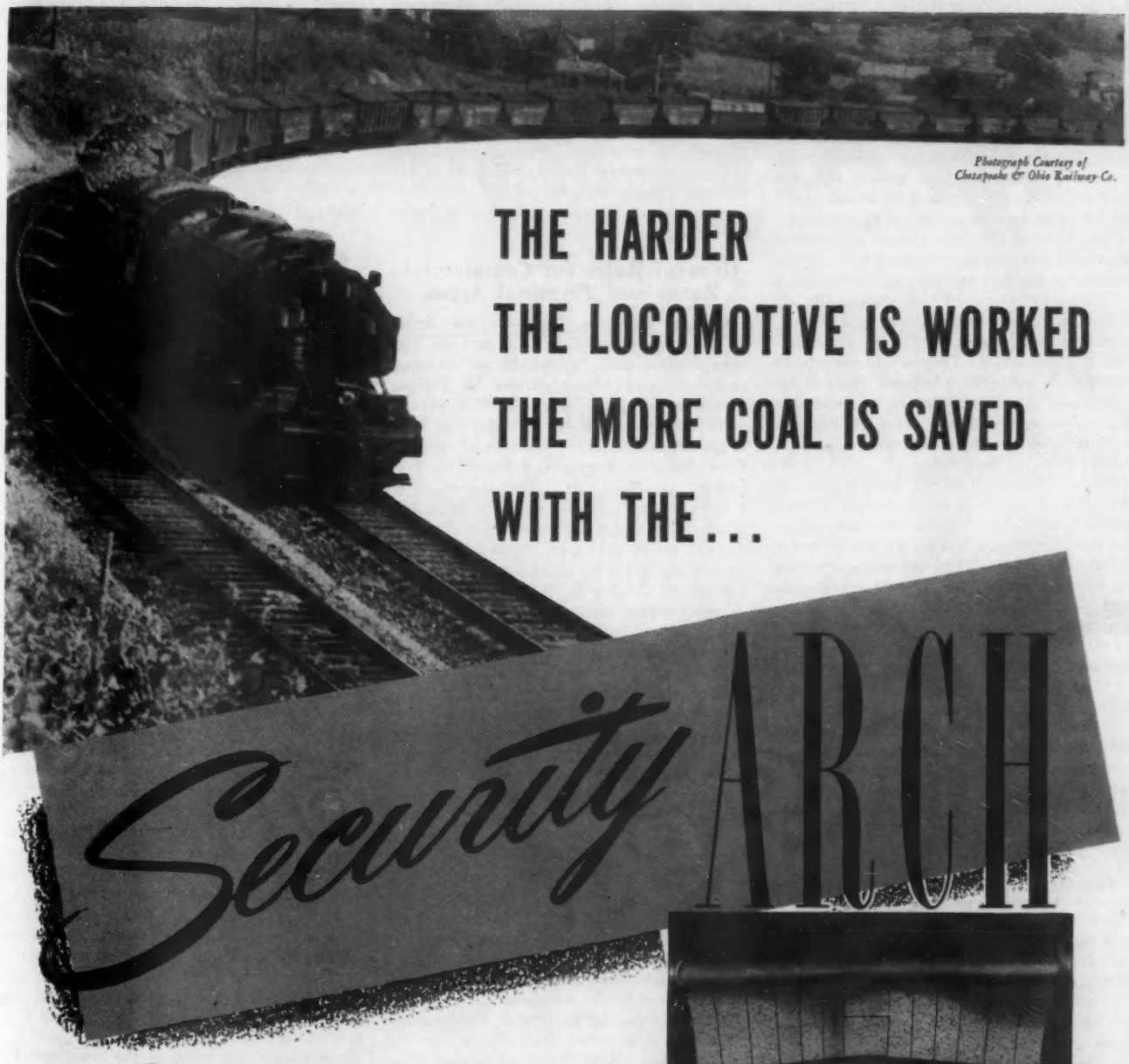
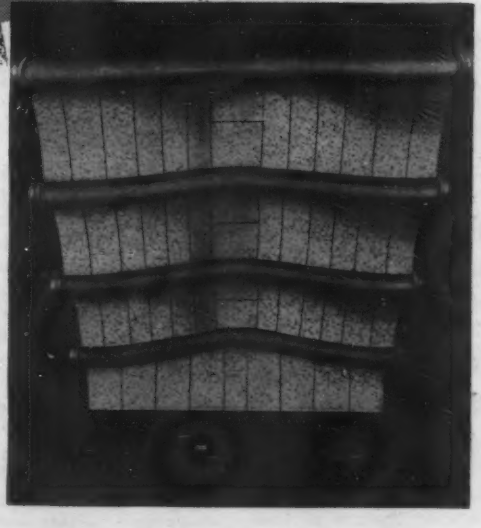


Photograph Courtesy of Chesapeake & Ohio Railway Co.

THE HARDER THE LOCOMOTIVE IS WORKED THE MORE COAL IS SAVED WITH THE...

Security ARCH

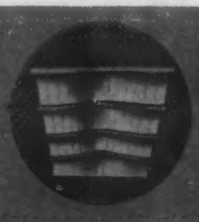


When locomotive runs were short and train speeds slow the Security Arch showed substantial fuel savings. With modern operation, involving long runs at high speeds, the Security Arch shows a greater economy. Today the Security Arch costs less per 1,000 ton miles and is a more important fuel saving factor than it was when the service was less severe.

With traffic demands boosting locomotive mileage a complete arch in the firebox is a fundamental to the economical use of coal.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists



AMERICAN ARCH CO.

INCORPORATED

60 EAST 42nd STREET, NEW YORK, N. Y.

Locomotive Combustion Specialists

use each facility where it is best fitted, most efficient and least costly. Clearly this is in the public interest.

Common Carriers Denied Choice—"However, this very principle of common ownership is denied to the common-carrier industry. Powerful groups in this country have, for the past 25 years, opposed joint ownership and operation among common carriers. This has resulted in an over-supply of basic facilities, even in time of war. It has brought the industry as a whole to the brink of bankruptcy, saved only by the transitory tonnage and earnings of the war.

"These same groups now oppose the effort of the railroads to secure legal permission to develop highway, waterway and airway transportation. They would perpetuate destructive competition between types of facilities, which has resulted in vast excesses in capital expenditures, both government and private,—in increased costs, and in higher rates to the public.

"The Transportation Association of America proposes that the principle of competition should be applied between transportation systems, similar to the program which has been worked out so successfully in England during the past 20 years. Unless the older forms of transportation are permitted to participate in the development of and the preservation of the newer forms, through coordination, common ownership or contractual arrangements, we are in for a battle royal in the post-war period, which will lead straight down the path to government ownership and to the resultant regimentation of other basic industries. Those who are responsible for promoting disintegration in the peace-time structure of the common-carrier industry should appraise their policies with care."

Westinghouse Officer Named A. I. E. E. President

Charles A. Powel, manager of Headquarters Engineering of the Westinghouse Electric & Manufacturing Company, was elected president of the American Institute of Electrical Engineers for the year beginning August, 1944.

The President's badge was presented to Mr. Powel at ceremonies opening the Institute's Summer Technical Meeting, June 26 to 30. A former vice-president and director of the A. I. E. E., and long noted as a diagnostician of power plant problems, Mr. Powel succeeds Dr. Nevin E. Funk, vice-president of the Philadelphia Electric Company.

Milwaukee to Test Inductive Communication System

The Chicago, Milwaukee, St. Paul & Pacific, starting in August, will make tests of the inductive system of train communication developed and manufactured by the Union Switch & Signal Company, and which has been in regular service on the Bessemer & Lake Erie and the Pennsylvania.

Unlike radio, the inductive system does not require wave length assignment. A carrier current, transmitted through the rails, the ground and the wires on the pole line along the right of way, is received by induction. Two-way telephone conversation is thus provided between enginemen and conductors as well as with crews of other trains or with operators in wayside stations.

According to information from the Milwaukee, the inductive system is expected to function successfully on the electrified territories of this road where high-voltage power lines parallel the tracks, and where there are many tunnels, both of which are said to be obstacles to dependable radio operation.

General Rules for Commercial Zones and Terminal Areas

General rules to determine the limits of the zone commercially a part of any municipality and the maximum terminal area which a motor carrier or freight forwarder properly may establish at any point authorized to be served have been recommended to the Interstate Commerce Commission in a proposed report by Examiner W. T. Croft. The report is in Ex Parte No. MC-37, the proceeding instituted by the commission upon its own motion to evolve such general rules in connection with its administration of the Interstate Commerce Act's terminal-area exemption provisions.

The latter are in sections 203(b) and 202(c). Under section 203(b), transportation by motor vehicle within a municipality or between contiguous municipalities, or within a zone adjacent to and commercially a part of any such municipality or municipalities is conditionally exempt from regulation except as to qualifications and maximum hours of service of employees and safety of equipment. Under section 202(c) the act's motor carrier regulatory provisions are made inapplicable to terminal trucking operations (collection and delivery and transfer services) performed by and on behalf of line-haul motor carriers and freight forwarders.

Zones Determined for Some Places—With respect to the commercial zone phase, the examiner pointed out that the commission has determined such zones for St. Louis, Mo., New York, Chicago, Los Angeles, Calif., Washington, D. C., Philadlphia, Pa., Cincinnati, Ohio, Kansas City, Mo., Boston, Mass., and Davenport, Iowa-Rock Island, Ill.-Moline. He added, however, that "this piecemeal approach, if carried to its logical extreme, would not only be tremendously burdensome but confusing and generally unsatisfactory." With respect to the terminal-area phase, the proposed report notes that this matter has been discussed in various proceedings, "but the maximum territory which a motor carrier or freight forwarder may include in its terminal area at a particular point still remains indefinite."

With the issues thus set up, Mr. Croft proceeds to look over the pertinent provisions of the act, the commission's determinations in several specific cases, and proposals of interested parties. He arrives at a proposed rule which would define a commercial zone as an area consisting of a base municipality, all municipalities contiguous to the base municipality, all municipalities wholly surrounded by the base municipality or wholly surrounded except by a water boundry, and other municipalities and incorporated areas adjacent to the base municipality. The latter would be made specific by stipulations to the effect that the extent of the surrounding area would vary with the population of the base municipality, the range being from one mile from the corporate limits of any base municipality of less than 2,500 population to four miles from the corporate limits of one with a population of 100,000 or more.

Formula Recommended—The examiner would construe a certificate or permit issued to a motor carrier authorizing service at a specified municipality as authorizing service also "(a) at all points in the unincorporated areas adjacent to such municipality which are within the commercial zone thereof and (b) at points within other incorporated municipalities which are wholly surrounded by the municipality named or wholly surrounded by such municipality except for a water boundary" but not "at points within any other incorporated municipality not so surrounded by the named municipality, whether contiguous or not."

From the foregoing, the examiner evolves his general rule for determination of motor carrier and forwarder maximum terminal areas within which collection and delivery and transfer operations are exempt from the act's motor-carrier regulatory provisions. His proposed rule makes the maximum terminal area at any incorporated municipality the same as that defined in the above rule regarding the interpretation of motor carrier certificates and permits, plus "all other municipalities, located within the commercial zone of the municipality authorized to be served *which the motor carrier or freight forwarder concerned is otherwise authorized to serve.*"

Turning to maximum motor carrier and forwarder terminal areas at unincorporated places, the examiner would define them in terms of miles from the post office, excluding, however, any place within the corporate limits of any municipality which might fall within such an area. The range would be from within one mile of the postoffice at unincorporated places of less than 2,500 population to within four miles at places with populations of 100,000 or more.

Four Railroads Accused of Safety Violations

Suits charging violation of the Federal Safety Appliance Act were filed against four railroads in the District Court at Memphis, Tenn., on July 5. The railroads are the Missouri Pacific, charged in eight counts; the Union, two counts, the Illinois Central, one count, and the St. Louis-San Francisco one count. The suits, filed by the district attorney, charge violations, including imporper brake adjustment and insecure grab irons. A fine of $100 on each count is asked.

Motor Vehicle Fleets to Get Gas by Ration Checks

In an effort to curb "black market" dealings in gasoline, the Office of Price Administration has instituted an arrangement, effective July 14, under which large operators of fleets of motor vehicles may set

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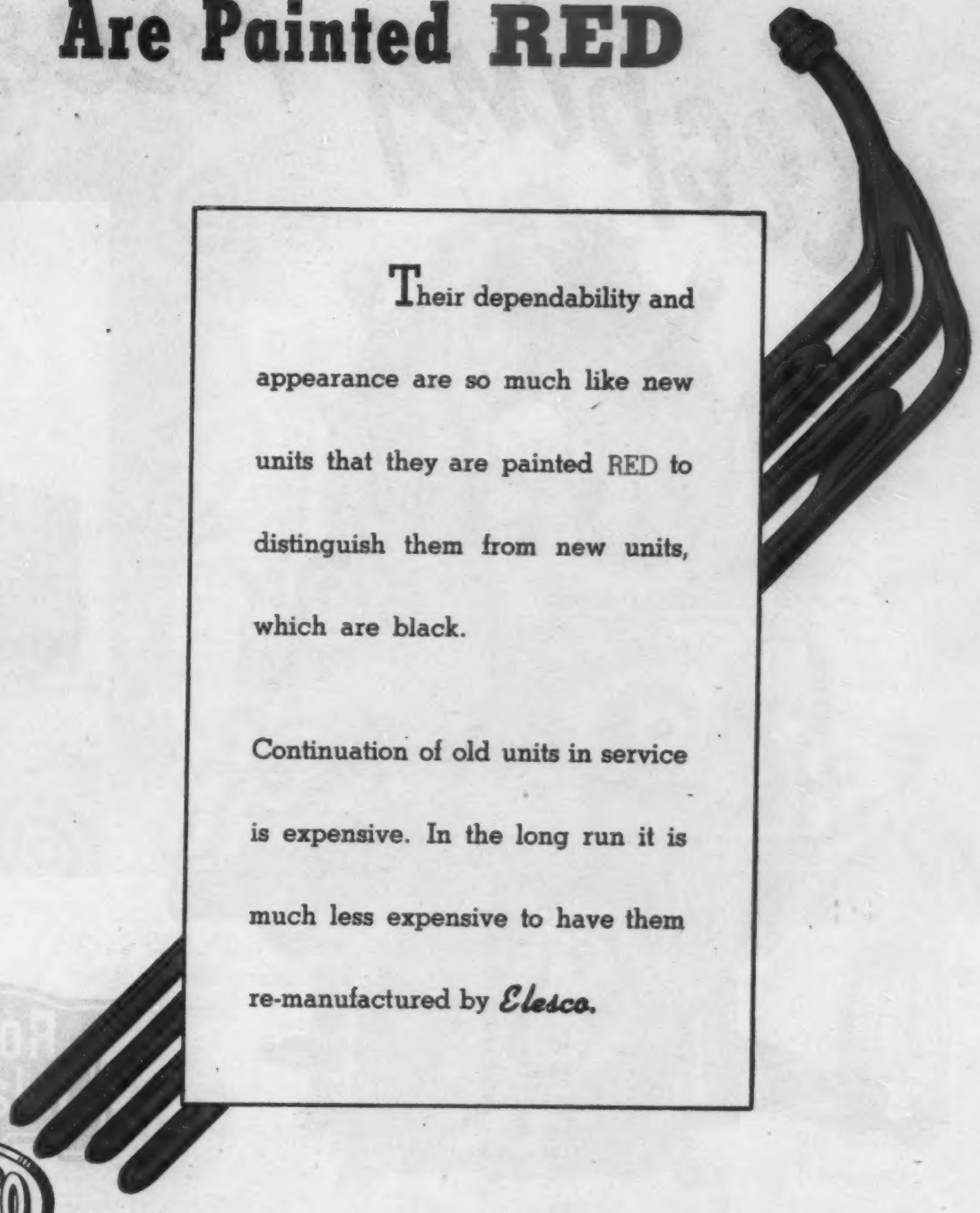
Re-manufactured Superheater Units Are Painted RED



Their dependability and appearance are so much like new units that they are painted RED to distinguish them from new units, which are black.

Continuation of old units in service is expensive. In the long run it is much less expensive to have them re-manufactured by *Elesco*.

ELESCO

SUPERHEATERS • FEEDWATER HEATERS
AMERICAN THROTTLES • STEAM DRYERS
EXHAUST STEAM INJECTORS • PYROMETERS

THE SUPERHEATER COMPANY

Representative of
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60 East 42nd Street, NEW YORK
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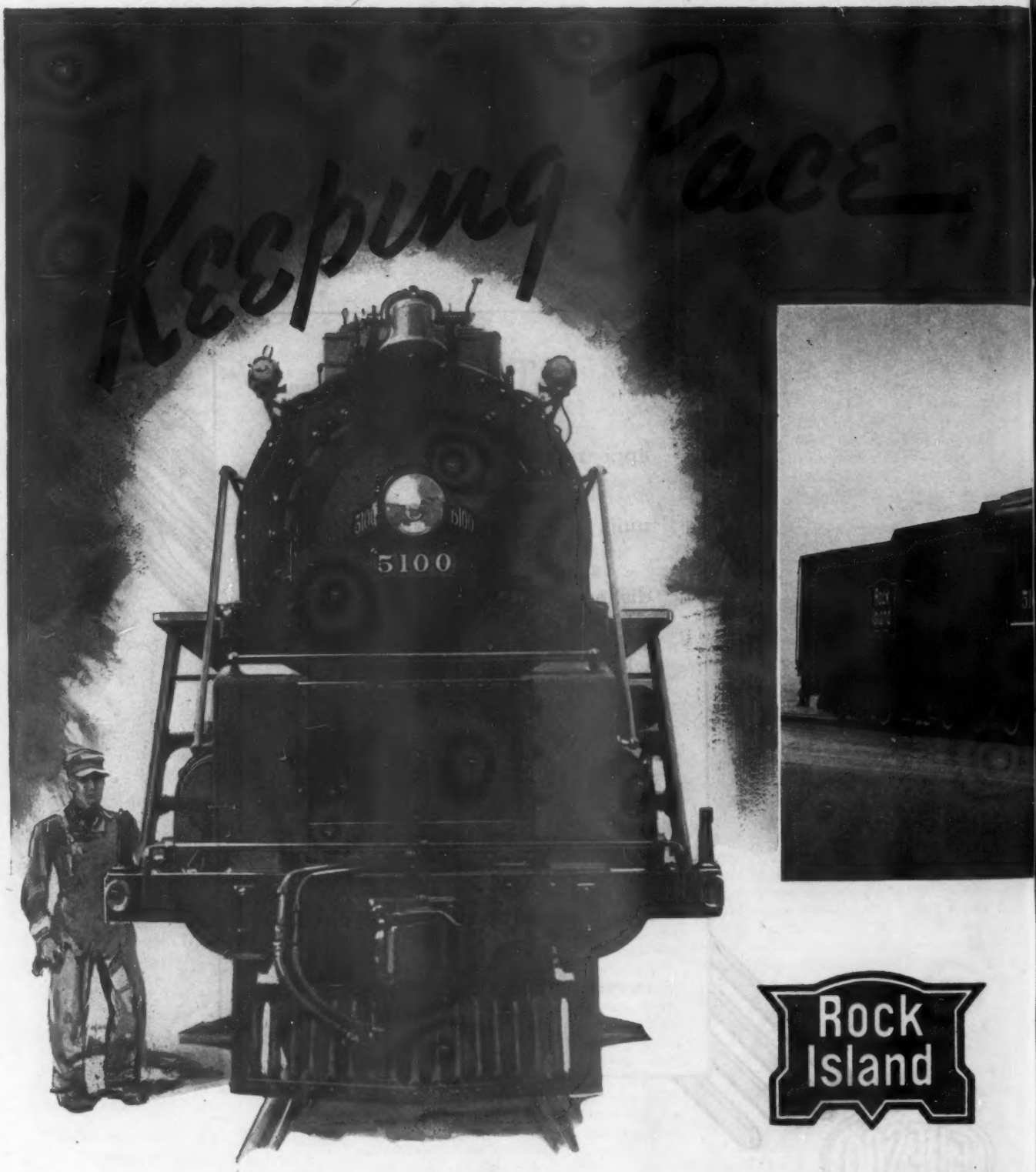
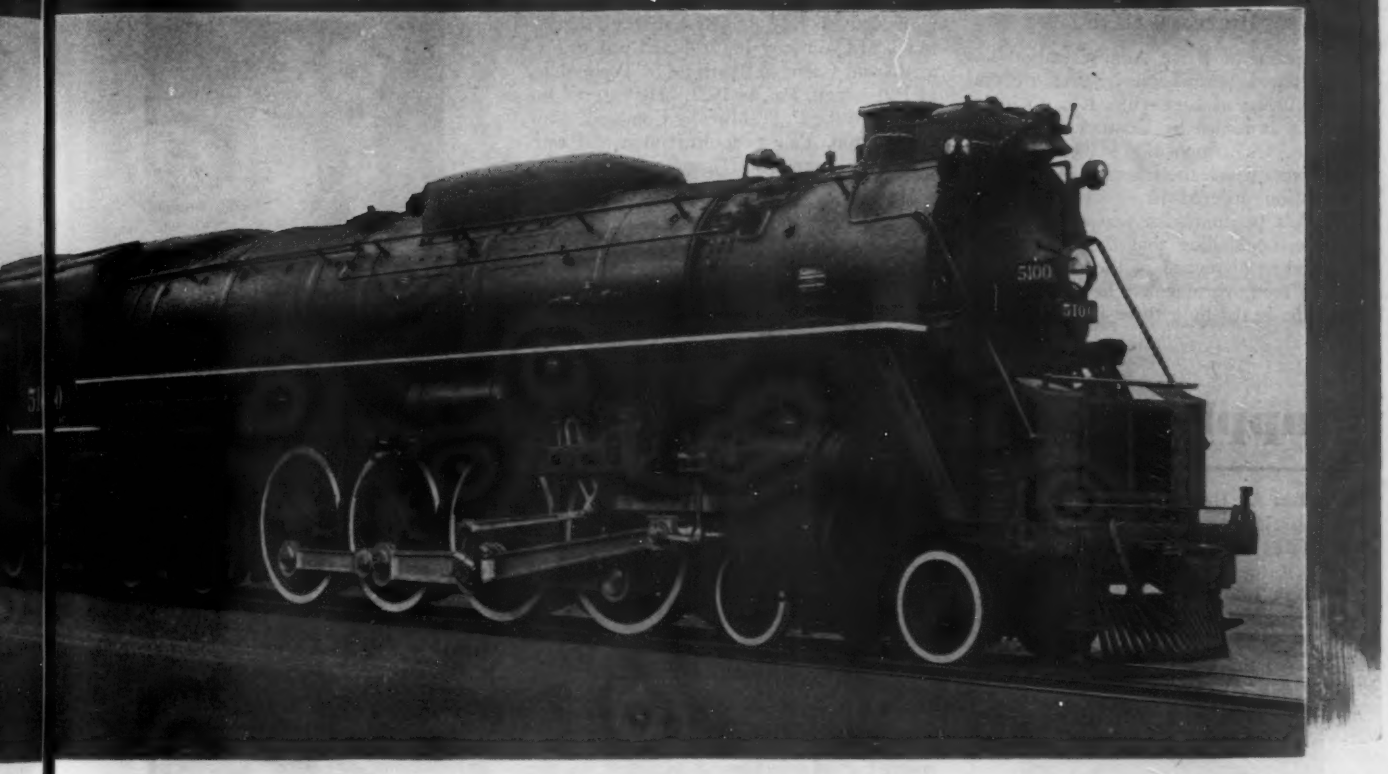
Montreal, Canada
THE SUPERHEATER COMPANY, LTD.



Buy War Bonds

WITH THE NATION'S NEEDS



Ten (10) Alco ultra-modern 4-8-4s, especially designed for high-speed mixed service, have been delivered recently to the Rock Island.

Locomotive Characteristics

Weight on Drivers	280,000 Lb.	Boiler Pressure	270 Lb.
Weight of Engine	467,000 Lb.	Tractive Power	67,000 Lb.
Cylinders	26 x 32 Ins.	Tender Capacity, Fuel	5,500 Gals.
Diameter of Drivers	74 Ins.	Tender Capacity, Water	21,500 Gals.

Alco

AMERICAN LOCOMOTIVE

MANUFACTURERS OF MOBILE POWER

STEAM, DIESEL AND ELECTRIC LOCOMOTIVES, MARINE DIESELS, TANKS, GUN CARRIAGES & OTHER ORDNANCE

up ration bank accounts, designate certain gasoline dealers from whom they intend to buy gasoline on ration credit, and then mail to the dealers at weekly intervals a "ration check" for the amount of gasoline supplied to units of the fleet during the week.

According to the O. P. A., this plan is designed to stop the flow of coupon books from drivers of fleet vehicles into the "black market," by eliminating the handling of coupons by the drivers. A "tight" system for keeping records and handling reports under this arrangement has been prescribed.

O. P. A. Intervenes in Fare Increase Case

The Office of Price Administration has been granted permission by the Federal District Court at Louisville, Ky., to intervene in a suit filed by Kentucky, Alabama and Tennessee in opposition to increased passenger fares which the Interstate Commerce Commission ordered in effect on July 1. O. P. A.'s petition asks that the order be set aside, contending that the Commission had acted in disregard of the anti-inflation policy of the government. The suit is scheduled to be heard by a three-judge court on July 17.

Supply Trade

Charles A. Benz, whose promotion to general sales manager of the **Chicago Malleable Castings Company,** and its subsidiary, the Allied Steel Castings Company, with headquarters at Chicago, was reported in the *Railway Age* of June 17, was born at Chicago on February 12, 1897, and entered the railway supply business in 1916 as a draftsman of the Union Metal

Charles A. Benz

Products Company. In 1918 he resigned to join the Joliet Railway Supply Company as assistant chief draftsman, later being promoted to mechanical engineer and assistant to the general manager. In 1924 Mr. Benz went with the Chicago Malleable Castings Company where he organized the brake beam department. After that department was in production he was advanced to sales engineer, and in 1937 he was further promoted to manager of the Railroad divisions of the two companies, the position he held at the time of his new appointment.

The **Pratt & Letchworth Co.,** Buffalo N. Y., has received a second renewal of its Army-Navy "E" award for continued meritorious production achievement.

The **Whiting Corporation,** Harvey, Ill., has received a second renewal of its Army-Navy "E" award for meritorious service on the production front.

W. E. Bikle, whose appointment as manager of the newly opened San Francisco office of the **Standard Railway Equipment Company** was reported in the *Railway Age* of July 8, was born at Hagerstown, Md., on July 16, 1898 and was graduated from Carnegie Institute of Technology at Pittsburgh, Pa., in 1921. He entered the employ of the P. H. Murphy Company, New Kensington, Pa., as a draftsman and estimator in August, 1921, and was promoted to assistant mechanical engineer in 1928. In February, 1936, he resigned to become mechanical engineer of the Chicago-Hutch-

W. E. Bikle

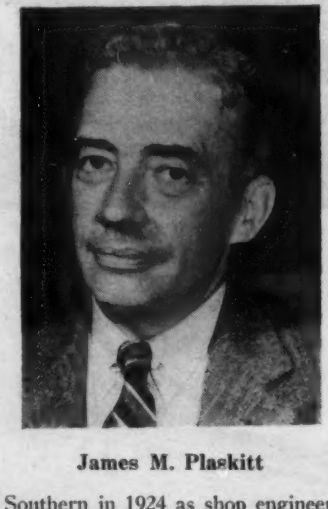
ins Corporation, Chicago, and was appointed chief mechanical engineer of the Standard Railway Equipment Manufacturing Company in July, 1939, when these two companies consolidated. In January, 1944, he was transferred to the sales force and on July 1, 1944, was promoted to manager of the San Francisco office.

The **Houdaille-Hershey Corporation** has purchased all of the stock of the **Honan-Crane Corporation,** manufacturer of oil purification equipment, which will be operated as a subsidiary.

Dudley Rice has been appointed a field engineer in the Chicago district for the **Eutectic Welding Alloys Company.** Mr. Rice was a sales specialist on the welding products of the American Brake Shoe Company and prior thereto was with the Erie.

Gordon S. McKenty has been appointed general sales manager of **R. G. Le Tourneau, Inc.,** Peoria, Ill., to succeed **Ed. R. Galvin,** whose resignation to become president and a director of the Tyson Bearing Corporation, Massillon, Ohio, was reported in the *Railway Age* of June 24.

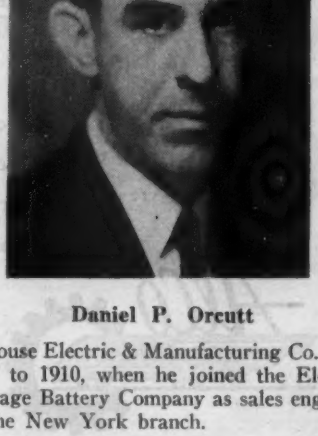
James M. Plaskitt, formerly mechanical engineer of the Southern Railway with headquarters in Washington, D. C., whose appointment as regional sales manager in the same city for the **Edward G. Budd Manufacturing Company** was reported in the *Railway Age* of July 8, was graduated from the United States Naval Academy and served in the Navy until 1924. He joined



James M. Plaskitt

the Southern in 1924 as shop engineer and since then has served in various positions with that railroad. His headquarters in Washington will be in the Budd offices at 1218 Connecticut Avenue, N. W. Mr. Plaskitt will report to Samuel M. Felton, general sales manager of the company's railway division.

Daniel P. Orcutt, assistant manager of the New York branch of the **Electric Storage Battery Company** since 1921, has been appointed manager of that branch to succeed **F. F. Sampson,** who retired July 1 after 30 years of service. Mr. Orcutt was graduated from Dension University and Cornell University. He was in the engineering department of the West-



Daniel P. Orcutt

inghouse Electric & Manufacturing Co. from 1907 to 1910, when he joined the Electric Storage Battery Company as sales engineer of the New York branch.

OBITUARY

H. Edward Manville, Sr., former chairman of the board of the Johns-Manville Corporation, died June 27. He was 72 years of age.

Equipment and Supplies

LOCOMOTIVES

The VIRGINIAN is inquiring for eight steam locomotives of 2-6-6-6 wheel arrangement.

The NEW YORK, ONTARIO & WESTERN has placed orders for 37 Diesel-electric locomotives of various sizes with the Electro-Motive division of the General Motors Corporation. When delivered, the locomotives will effect complete Dieselization of the railroad. A petition to the federal district court at New York to Dieselize the motive power of the road was filed on June 28 by Frederic E. Lyford, trustee, and reported in the *Railway Age* of July 1. Cost of the project was estimated at $6,700,000.

The BOSTON & MAINE has ordered six Diesel-electric freight locomotives of 5,400 hp. from the Electro-Motive division of the General Motors Corporation. The railroad previously had ordered twelve locomotives of the same type from Electro-Motive, six in March, 1942, and six in March, 1943. Of the total of 18 ordered, four are now in service, with eight scheduled for delivery this year and six in 1945.

FREIGHT CARS

The MISSOURI PACIFIC has ordered 25 aluminum-alloy hopper cars of 70 tons' capacity from the American Car & Foundry Co. Aluminum alloy will be used for the entire body of these cars, while the center sill and bolster will be steel. The cars will each have an empty weight of about 37,100 lb., compared with an average of 50,100 lb. for convention all-steel 70-ton hopper cars. They will be 39 in. longer than the usual all-steel units, permitting a capacity increase of 240 cu. ft. The aluminum sheets are to be somewhat thicker than the conventional steel sheets, giving them equal strength. The inquiry for this equipment was reported in the *Railway Age* of June 3.

SIGNALING

The CENTRAL OF GEORGIA has placed an order with the Union Switch & Signal Company for materials to install automatic block signaling on 119 miles of single-track main-line between Columbus, Ga., and Birmingham, Ala. The order includes style H-2 searchlight signals, circuit controllers, relays, rectifiers, and housings.

The NEW YORK CENTRAL is providing radio communication in the westbound freight classification yard at Selkirk, N. Y., the project including the installation of apparatus on three yard locomotives and in the hump yard office. The radio equipment, which is being installed by the General Railway Signal Company, will operate under an experimental license granting permission for use of frequencies of 30,000 to 40,000.

Financial

BALTIMORE & OHIO.—*Promissory Notes.*—Division 4 of the Interstate Commerce Commission has authorized this road to issue $1,200,000 of promissory notes, series D, in evidence of, but not in payment for, the unpaid portion of the cost of 500 50-ton steel hopper cars from the Bethlehem Steel Co. under a conditional sales agreement. Sale of the notes was reported in *Railway Age* of June 17, page 1191.

CHICAGO, SOUTH SHORE & SOUTH BEND.—*Common Stock Offered.*—On July 11, an underwriting group headed by H. M. Byllesby & Co., offered 249,556 shares of common stock of the Chicago, South Shore & South Bend at $12.50 a share. The stock was acquired by the bankers from the estate of the Midland Utility Company and does not represent new financing for the railroad.

DENVER & RIO GRANDE WESTERN.—*Reorganization.*—Division 4 of the Interstate Commerce Commission has certified the result of the vote of certain classes of creditors upon the question of accepting the plans for the reorganization of this company and of the Denver & Salt Lake Western, which were approved in 1943 by the commission and the federal court. The plans were accepted by the Reconstruction Finance Corp., holder of both companies' secured notes, by the Chase National Bank, holder of a secured note of the D. & R. G. W., and by the D. & R. G. W. as holder of the common stock of the D. & S. L. W. A fractional percentage of the votes of the holders of D. & R. G. W. first consolidated bonds, first trust mortgage bonds, and first consolidated mortgage bonds was registered in opposition to the plans. The plans were accepted by 80 per cent of the holders of the series A refunding and improvement mortgage bonds and by 95.88 per cent of the series B refunding and improvement mortgage bonds. Holders of the general mortgage bonds voted 79.33 per cent against acceptance of the plans, however, this percentage being equivalent to $5,111,100 principal amount of the issue.

ILLINOIS TERMINAL.—*Equipment Trust Certificates.*—This road has applied to the Interstate Commerce Commission for authority to assume liability for $690,000 of series B serial equipment trust certificates to be issued and sold through competitive bidding in connection with the purchase, at a total cost of $869,000, of 200 50-ton box cars and 75 50-ton composite type hopper cars.

NEW YORK, CHICAGO & ST. LOUIS.—*Equipment Trust Awarded.*—On July 11, the Nickel Plate awarded, subject to Interstate Commerce Commission approval, a $2,100,000 issue of 1944 serial equipment trust certificates to the Cleveland Trust Company, on its bid of 99.882 for 1⅞ per cent obligations, an interest cost basis to the railroad of about 1.90 per cent. The certificates will be dated July 15, 1944, and will mature in ten equal installments of $210,000 each, beginning in 1945. The new issue will finance in part the purchase of fifteen 2-8-4 type freight locomotives, with 22,000-gallon tenders, and 25 70-ton covered hopper cars, to cost approximately $2,684,207. (Previous item in *Railway Age* of July 1.)

RUTLAND.—*Trustees Named.*—On July 7 William E. Navin, present receiver for the Rutland, and Wallace M. Fay, of Proctor, Vt., were appointed trustees in bankruptcy for the railroad by United States District Court Judge James P. Leamy.

Average Prices Stocks and Bonds

	July 11	Last week	Last year
Average price of 20 representative railway stocks..	42.39	42.17	39.45
Average price of 20 representative railway bonds..	89.71	89.31	80.36

Dividends Declared

Northern of New Hampshire.—$1.50, quarterly, payable July 31 to holders of record July 13.

Piedmont & Northern.—50¢, quarterly, payable July 20 to holders of record July 5.

Western New York & Pennsylvania.—Common, $1.50, semi-annually, payable July 1 to holders of record June 30.

Abandonments

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—In a proposed report Examiner Jerome K. Lyle has recommended that the Interstate Commerce Commission deny the application of this road and the Wisconsin Central for authority to abandon operation of and to abandon, respectively, a branch from Stevens Point, Wis., to Portage, 69.2 miles, together with a 7.7-mile branch connecting therewith at Packwaukee Junction and terminating at Montello. He pointed out, however, that the line has been operated at a substantial loss, and that it has apparently not been used for the major transportation needs of the territory it serves, and therefore suggested the application be denied without prejudice to its renewal at the end of 1945, by which time, he suggested, war demands may be somewhat alleviated, more motor trucks may be available, and it will be possible to determine more definitely the line's future traffic prospects. Referring to the apparent necessity for early rebuilding of two large bridges in the segment between Plover and Stevens Point, 4 miles, the examiner suggested that arrangements be made for operation under trackage rights over the line of the Green Bay & Western between these points, pending a final determination of the line's future.

PACIFIC COAST.—In a proposed report Examiner R. R. Molster has recommended that the Interstate Commerce Commission authorize this road to abandon a branch from Maple Valley, Wash., to Taylor, about 9 miles. As noted in *Railway Age* of September 26, 1942, page 510, Division 4 of the commission in 1942 denied an application for such authority, but without prejudice to a subsequent renewal of the application, which was filed on September 11, 1943. The abandonment was opposed on both occasions by a shipper of clay products located at the terminus of the line, but the examiner observed that the record clearly indicates that the traffic that this shipper is able and willing to give the branch is not, and holds no prospects

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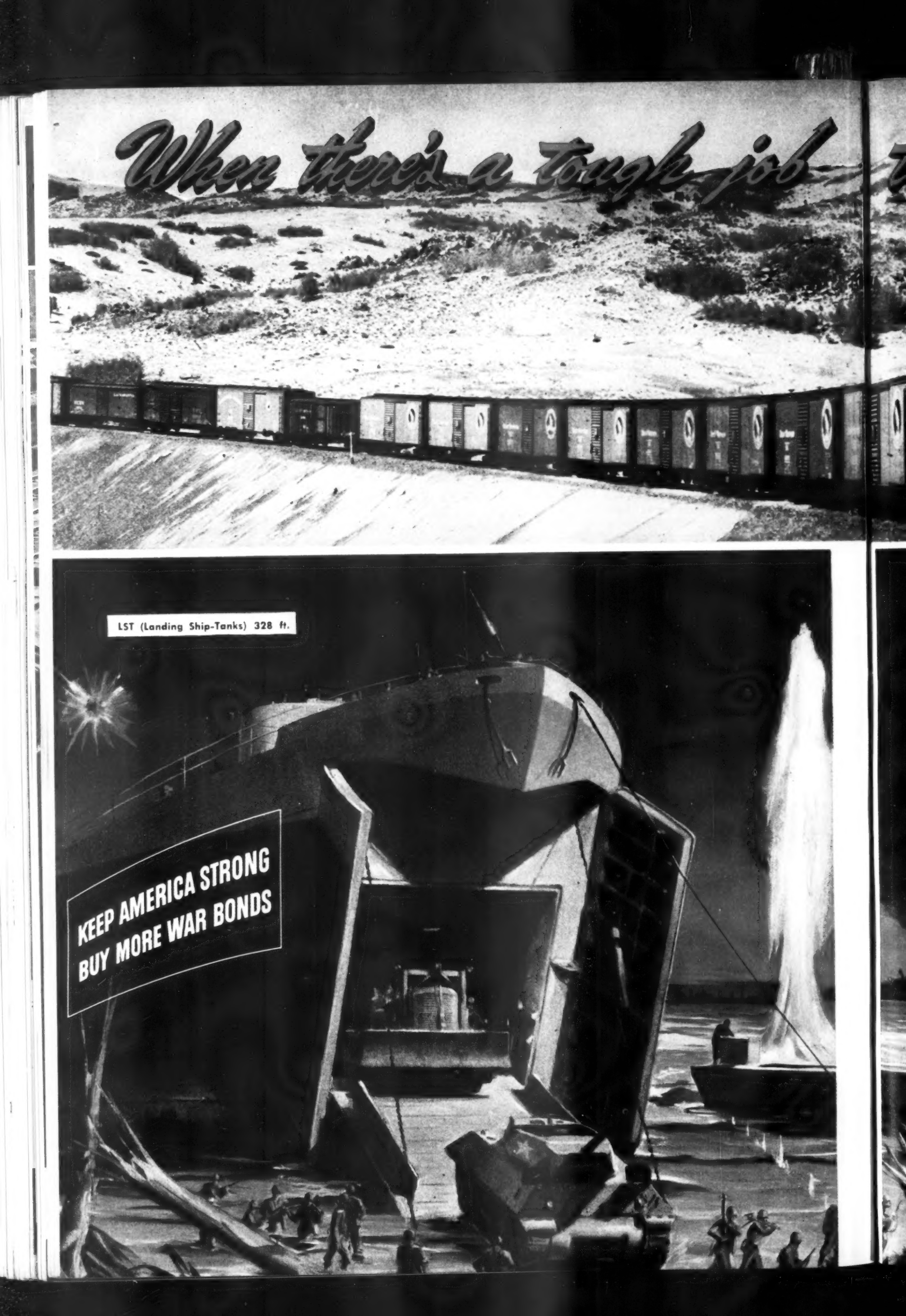
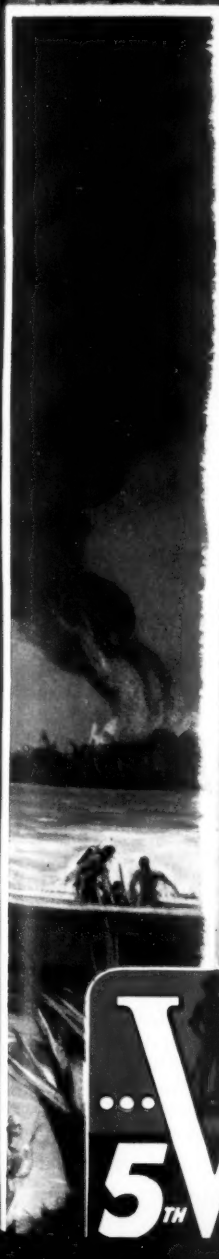

When there's a tough job
LST (Landing Ship-Tanks) 328 ft.
KEEP AMERICA STRONG
BUY MORE WAR BONDS

Two-unit (2700 Hp.) General Motor Diesel Freight Locomotive approaching the summit of the Continental Divide, near Butte, Montana.



it's GM LOCOMOTIVE DIESELS

THE magnificent job which our invasion boats have done and are doing all over the world, is a matter of record. Particularly outstanding are the LSTs, all of which are powered by General Motors Diesel Engines, the same rugged and dependable prime movers which now power over 1500 locomotive units with more than 200 million miles of service.

★ *VICTORY IS OUR BUSINESS* ★

GENERAL MOTORS LOCOMOTIVES

...V— 5TH WAR LOAN

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORPORATION — LA GRANGE, ILLINOIS, U.S.A.

of becoming, sufficient to support its operation. This shipper cannot reasonably expect to be kept in business at the carrier's expense, and he has had sufficient time to adjust his affairs to a development which must have been recognized as inevitable, said the proposed report.

Railway Officers

EXECUTIVE

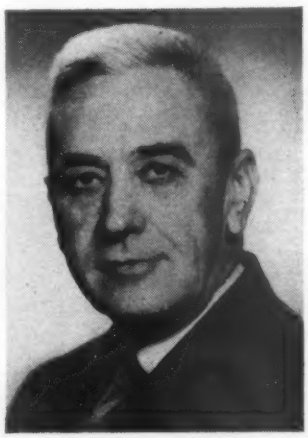
Ernest S. Marsh, chief clerk in the president's office of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, has been promoted to assistant to the president. Mr. Marsh was born in Lynchburg, Va., on January 10, 1903, and entered railway service on April 1, 1918, as a file clerk of the Santa Fe at Clovis, N. Mex. He advanced through the positions of assistant timekeeper, head timekeeper, assistant division accountant and division accountant at

Ernest S. Marsh

Clovis, N. Mex., and on May 12, 1932, was made head clerk in the division accounts bureau at Amarillo, Tex. Five years later he was promoted to general clerk in the auditor of disbursement's office at Topeka, Kan., where on January 1, 1940, he was made chief clerk and on July 1, 1940, was promoted to auditor of disbursements. On September 1, 1942, he was made chief clerk in the president's office at Chicago.

OPERATING

John A. Rogers, whose appointment as regional assistant general manager of the Canadian National's Central region was announced in the *Railway Age* of July 8, was born at Cayuga, Ont., and was graduated in civil engineering from the Royal Military College at Kingston, Ont., in 1904. He entered railway service the same year as draftsman of the Illinois Central at Chicago. After serving as engineering assistant of the National Transcontinental Railways, he became resident engineer of the Mackenzie Mann Company at Edmonton, Alta., in 1911. Mr. Rogers was division engineer of the Canadian Northern (now Canadian National) and the Canadian National at Saskatoon, Sask., from 1916 to 1927, when he became assistant superintendent at that location. In 1930 he was appointed superintendent at Prince Albert, Sask., being transferred to Hornepayne, Ont., that same year.



John A. Rogers

He also was superintendent at Allandale and Ottawa, Ont., and in 1942 was named general superintendent of transportation of the Central region, at Toronto. This position he held until his present appointment as assistant general manager of the Central region. **Oscar Masse,** whose promotion to the post of general superintendent of transportation of the Central region succeeding Mr. Rogers was announced in the July 8 *Railway Age,* was born November 6, 1884, at Coteau Station, Que. On November 1, 1901, he joined the Grand Trunk (now Canadian National) as clerk, serving in this capacity until 1903, when he became a telegraph operator. After successively filling the positions of train dispatcher, night chief dispatcher, chief train dispatcher, and acting trainmaster, he was named inspector of terminals in January, 1922. Mr. Masse was trainmaster from August, 1923, until May of the following year when he was ap-

Oscar Masse

pointed assistant superintendent. On December 1, 1927, he was named regional inspector of transportation, being promoted to superintendent of the Levis division in November, 1936. In 1939 he became superintendent of transportation, and in 1940 was advanced to general superintendent of the Quebec district. He continued in this latter capacity until his present appointment as regional general superintendent of transportation.

Alfred J. Lomas, whose new appointment as general superintendent of the Montreal district at Montreal also was reported in the July 8 *Railway Age,* was born at Derby, England, on February 17, 1888. On July 3, 1909, he entered the service of the Canadian Northern (now Canadian National) as a baggageman, subsequently being employed as a clerk in the office of the superintendent of transportation and in the bridge and building department, and as dock agent at Trenton and Key Harbor, Ont. In 1914, he again assumed the post of chief clerk, becoming yard agent in 1917 and agent the following year. Mr. Lomas was appointed yardmaster of the Capreol division in August, 1918. After serving as yardmaster and fuel supervisor at various locations, he became acting assistant superintendent at Hornepayne, Ont., and later at Capreol, Ont. From October, 1930, until 1940 Mr. Lomas was yardmaster and assistant superintendent at several points. He was appointed division superintendent at

Alfred J. Lomas

Capreol in February, 1940, being moved to Toronto two years later as superintendent of terminals. It was this post which he held until his recent promotion to general superintendent, Montreal district.

J. W. Harman has been appointed assistant superintendent, Laurentian division, of the Canadian Pacific.

R. C. Bunting has been appointed safety supervisor of the Southern Pacific with headquarters at San Francisco, Calif.

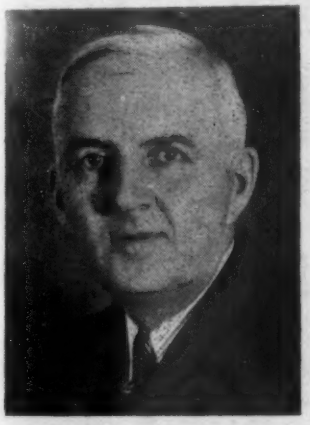
P. H. Fox, superintendent of the Ottawa division, Canadian National, has been appointed general superintendent of transportation of the Atlantic region to succeed **W. E. Robinson,** whose new position as general superintendent of the Northern Ontario district was announced in the July 8 *Railway Age.*

F. A. Pouliot, whose appointment as general manager of the Canadian Pacific was announced in the *Railway Age* of June 24, entered the service of the Canadian Pacific at Farnham, Que., in 1911 as a stenographer. Subsequently, in 1916, he was promoted to telegraph operator, and in 1918,

he was appointed train dispatcher. In 1937 he became chief train dispatcher of the Laurentian division at Montreal, and in 1940 he became supervisor of transportation at North Bay, Ont. Mr. Pouliot has also seen service as acting superintendent at Woodstock, N. B., and assistant to the general superintendent at Montreal. At the time of his present appointment he was superintendent of the Laurentian division at Mont-

F. A. Pouliot

real, a position which he held since May, 1943. **Gifford D. Wadsworth,** whose retirement as general manager also was announced in the *Railway Age* of June 24, was born at Sherbrooke, Que., on July 15, 1884. He entered the service of the Quebec Central (part of the Canadian Pacific) in 1899 as a messenger boy, then serving successively as stenographer and clerk in the car service and superintendent's office and the traffic department, and chief clerk in the traffic department. In March, 1916, Mr. Wadsworth became assistant general freight and passenger agent of the Quebec Central, being named general freight and passenger agent two years later. In 1928 he was appointed assistant general manager, and was



Gifford D. Wadsworth

promoted to the post of general manager in 1931, a capacity in which he served until his present retirement.

William L. Hack, whose retirement as division superintendent of the Southern Pacific with headquarters at Sacramento, Calif., was announced in the *Railway Age* of July 1, was born at Vallejo, Calif., on October 10, 1880, and entered railway service in January, 1897, with the Southern Pacific as a laborer and car cleaner at Indio, Calif. Later he became a fireman and an engineman and still later served as road foreman of engines on the Tucson division and then for the Southern district. In September, 1918, he was promoted to assistant superintendent of the Sacramento division and three years later was advanced to superintendent of the Salt Lake division at Ogden. In November, 1924, he was transferred to the San Joaquin division at Bakersfield and on June 1, 1925, was made superintendent of the Sacramento division.

W. E. Haist, superintendent of the Aurora and LaCrosse division of the Chicago, Burlington & Quincy, with headquarters at Aurora, Ill., has been promoted to superintendent of transportation with headquarters at Chicago and has been succeeded by **J. L. Mulroy,** assistant superintendent of the Aurora division with headquarters at Aurora.

TRAFFIC

Joseph Alyre Breau has been appointed general agent, passenger department, of the Canadian National, at St. John, N. B. He was formerly rate clerk.

H. J. Reis has been appointed general freight agent of the Pittsburgh & West Virginia with headquarters at Pittsburgh, Pa. The position of assistant general freight agent, rates, has been abolished.

Donald Sutherland, general agent of the Union Pacific with headquarters at Minneapolis, Minn., has been appointed general agent, freight department, with headquarters at Portland, Ore., and has been succeeded by **Millard A. Light,** traveling freight and passenger agent at Tulsa, Okla.

C. W. Linker, district passenger agent of the Pennsylvania, with headquarters at Omaha, Neb., has been transferred to Atlanta, Ga., and has been succeeded by **Herman B. Peterson,** passenger representative at Detroit, Mich.

ENGINEERING & SIGNALING

H. C. Forman, division engineer of the Louisville & Nashville, with headquarters at Ravenna, Ky., has been appointed assistant engineer of the miscellaneous department with headquarters at Louisville and has been succeeded by **John U. Estes,** assistant division engineer at Birmingham, Ala., who in turn has been succeeded by **Walter E. Quinn,** assistant engineer at Louisville.

George H. Fair, division engineer of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., has been transferred to the Salt Lake division with headquarters at Ogden, Utah, to succeed **Jack Stewart,** deceased, and has been succeeded by **T. W. Saul,** division engineer of the Sacramento division with headquarters at Sacramento, Calif., who in turn has been succeeded by **W. F. Turner.**

Horace Waldo Flemming, whose appointment as district engineer of the North Ontario district, Canadian National, was reported in the *Railway Age* of July 8, was born at Liverpool, N. S. Beginning his railroad career in 1909 at Colbourne, Ont., as a rodman for the Canadian National, Mr. Flemming went to St. Prime, Ont., the following year, as resident engineer. He then served as transitman at Toronto, Ont., and Ottawa, Ont., and, from 1911 to 1919, as resident engineer of the James Bay & Eastern, Toronto-Hamilton, Toronto-Ottawa, and Hawkesbury-Montreal districts,

Horace Waldo Flemming

successively. In 1919 he became engineer in charge of the Ontario and Quebec lines of the Canadian National, being appointed resident engineer of the St. Lawrence district in 1920, and assistant engineer of that district the next year. He acted in a similar capacity at Toronto, Ottawa, and Hornepayne, Ont., until May, 1923, when he was named inspecting engineer at Toronto. In October, 1925, Mr. Flemming became division engineer at Hornepayne. He moved to Montreal, Que., in March, 1928, as assistant district engineer, maintaining that post until his recent promotion to the position of district engineer of the Northern Ontario district, with headquarters at North Bay. **Charles Herbert Newton Connell,** who has retired from the position of engineer of the Northern Ontario district, was born at Woodstock, N. B., and entered railroading in 1897 in the office of the division engineer, Crow's Nest Pass (now part of Canadian Pacific). In 1899 he became topographer on survey with the Ontario & Rainy River, and 1900 joined the Algoma Central & Hudson Bay as rodman and resident engineer. Two years later he went to Liverpool, N. S., as instrumentman on construction with the Halifax & South Western (now part of Canadian National), and in 1903 moved to Lethbridge, Alta., as engineer maintenance of way and chief engineer of the Alberta Railway and Irrigation Company. Mr. Connell was appointed district engineer of the Canadian National in 1909, at Quebec, serving in a like capacity at Toronto from January, 1921, to September, 1925, when he became district engineer of the Northern Ontario district with headquarters at North Bay. This post he held until his recent retirement.

MECHANICAL

George M. Duck has been appointed traveling master mechanic of the Gulf, Mobile & Ohio, with headquarters at Mobile, Ala.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1944—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues			Operating expenses					Operating ratio	Net from railway operation	Operating income	Net railway operating income	
			Freight	Passenger	Total (inc. misc.)	Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total				1944	1943
Gulf, Mobile & Ohio	May	1,973	$2,832,816	$219,779	$3,175,546	$511,662	$537,666	$81,711	$907,687	$2,159,310	68.0	$1,016,236	$559,833	$381,375	$331,962
	5 mos.	1,973	13,803,745	1,109,514	15,427,853	2,508,893	2,598,148	399,178	4,267,341	10,354,654	67.1	5,073,199	2,666,430	1,919,009	2,191,960
Illinois Central	May	4,823	14,972,039	3,438,480	19,605,100	2,806,777	3,263,731	173,078	5,255,880	12,124,996	61.8	7,480,104	2,979,372	2,658,742	2,711,572
	5 mos.	4,823	71,157,998	15,187,028	92,066,157	11,973,438	16,221,774	939,524	26,369,560	58,617,966	63.7	33,448,191	13,399,206	11,908,194	14,667,428
Yazoo & Mississippi Valley	May	1,524	2,070,779	449,759	2,669,301	487,862	321,301	26,606	953,834	1,880,260	70.4	789,041	348,332	231,958	987,309
	5 mos.	1,524	11,410,013	2,115,097	14,326,295	2,150,827	1,625,030	149,643	4,746,778	9,132,463	63.7	5,193,832	2,348,952	1,833,443	3,341,947
Illinois Central System	May	6,347	17,042,818	3,888,239	22,274,401	3,294,639	3,585,032	199,684	6,209,714	14,005,256	62.9	8,269,145	3,321,728	2,896,614	3,698,794
	5 mos.	6,347	82,568,011	17,302,125	106,392,452	14,124,265	17,846,804	1,089,167	31,116,338	67,750,429	63.7	38,642,023	15,723,850	13,764,202	18,017,939
Illinois Terminal	May	476	637,754	177,595	893,745	109,236	100,925	19,584	277,744	531,430	59.46	362,315	139,692	106,928	112,774
	5 mos.	476	3,416,766	869,183	4,679,062	471,466	460,295	98,895	1,422,944	2,586,043	55.27	2,093,019	730,034	583,234	572,193
Kansas City Southern	May	878	3,240,859	403,429	3,822,226	518,440	501,479	62,061	990,168	2,214,352	57.9	1,607,874	729,874	464,410	222,673
	5 mos.	878	15,336,794	2,257,060	18,583,977	2,612,377	2,505,888	310,639	5,026,467	11,100,123	59.7	7,483,854	3,558,854	2,357,144	2,769,259
Kansas, Oklahoma & Gulf	May	328	353,770	1,775	338,048	45,399	21,508	9,657	75,072	162,870	45.5	195,178	109,177	89,483	1,583
	5 mos.	328	1,707,568	7,910	1,730,366	189,384	109,704	46,688	394,345	794,392	45.9	935,974	521,123	402,942	397,916
Lake Superior & Ishpeming	May	156	265,916	135	355,438	41,193	28,203	544	69,394	147,101	41.4	208,337	175,609	182,228	188,873
	5 mos.	156	564,843	680	722,524	140,095	194,760	2,852	216,760	595,329	82.4	127,195	—10,197	31,295	—67,686
Lehigh & Hudson River	May	96	295,077	.....	295,461	55,651	37,184	5,478	84,636	190,073	64.3	105,388	49,187	23,940	24,693
	5 mos.	96	1,475,019	1,653	1,480,775	225,362	171,981	26,493	435,435	895,337	60.5	585,438	241,208	130,848	151,736
Lehigh & New England	May	190	541,793	.....	544,796	53,555	126,604	7,685	156,312	367,367	67.4	177,429	107,630	122,511	143,780
	5 mos.	190	2,619,542	.....	2,634,442	244,363	603,278	38,988	775,280	1,765,070	67.0	869,372	482,194	537,859	594,597
Lehigh Valley	May	1,260	8,080,436	702,704	9,221,962	1,193,137	1,377,200	122,073	3,214,264	6,116,055	66.3	3,105,907	1,427,186	921,767	875,128
	5 mos.	1,260	36,069,224	3,582,078	41,823,089	5,644,021	6,533,272	605,908	15,658,364	29,522,458	70.6	12,300,631	6,438,287	4,152,526	5,516,607
Louisiana & Arkansas	May	834	1,472,068	158,460	1,691,716	388,869	182,242	32,844	366,947	1,032,463	61.0	659,253	225,887	154,275	203,684
	5 mos.	834	7,171,824	761,943	8,240,201	1,805,847	898,069	177,614	1,808,653	5,005,949	60.8	3,234,252	1,175,818	840,034	999,535
Louisville & Nashville	May	4,745	13,389,076	3,862,262	18,308,657	1,980,410	2,980,040	216,075	5,365,127	11,076,377	60.5	7,232,280	1,952,732	2,134,019	2,211,859
	5 mos.	4,745	64,396,653	18,638,468	88,339,686	9,725,657	15,127,942	1,005,451	25,423,680	54,199,270	61.4	34,140,416	8,988,125	10,308,293	10,989,234
Maine Central	May	988	1,230,484	275,243	1,632,115	253,794	276,998	10,670	535,351	1,123,991	68.9	508,124	163,141	165,683	205,157
	5 mos.	988	6,297,977	1,490,492	8,334,091	1,444,656	1,404,189	64,380	2,970,336	6,131,506	73.6	2,202,585	1,047,328	844,549	1,351,237
Midland Valley	May	334	141,283	37	143,583	42,396	12,271	2,324	47,440	109,081	76.0	34,502	26,997	17,242	22,218
	5 mos.	334	690,462	1,001	701,403	137,762	60,454	11,919	232,929	467,115	66.6	234,288	159,766	102,303	221,279
Minneapolis & St. Louis	May	1,408	1,089,398	35,261	1,172,108	257,581	165,823	64,907	375,261	922,909	78.7	249,199	111,257	95,744	259,474
	5 mos.	1,408	5,600,498	185,050	6,019,190	1,079,736	863,355	330,597	1,925,261	4,487,220	74.5	1,531,970	749,866	724,476	1,558,475
Minneapolis, St. Paul & Sault Ste. Marie	May	4,277	4,103,785	221,709	4,634,771	731,475	777,896	75,581	1,528,188	3,247,861	70.1	1,386,910	1,104,262	1,080,103	713,455
	5 mos.	4,277	19,229,426	1,100,759	21,645,675	3,045,210	3,534,542	364,062	7,816,492	15,386,802	71.1	6,258,873	4,840,494	4,543,015	2,703,955
Duluth, South Shore & Atlantic	May	551	270,141	23,302	316,649	65,824	59,052	8,110	131,350	272,358	86.0	44,291	24,273	25,057	111,304
	5 mos.	551	1,528,535	139,381	1,768,378	306,326	273,377	43,019	672,989	1,336,170	75.6	432,208	349,435	317,354	299,646
Spokane International	May	152	186,399	10,729	204,772	35,937	15,670	3,630	54,710	116,777	57.0	87,995	44,279	31,265	24,930
	5 mos.	152	790,575	48,856	880,111	230,054	71,849	17,296	249,354	602,947	68.5	277,164	163,565	103,217	151,890
Mississippi Central	May	158	187,821	2,873	193,151	31,695	16,260	8,809	48,077	111,903	57.9	81,248	52,618	37,501	21,660
	5 mos.	158	902,978	28,154	943,006	148,084	83,048	44,722	255,697	569,057	60.3	373,949	239,949	171,278	140,458
Missouri & Arkansas	May	365	218,948	3,634	230,945	45,208	23,076	7,470	65,832	148,793	64.4	82,152	51,879	35,585	—17,885
	5 mos.	365	938,521	18,001	1,002,790	220,761	110,224	37,413	330,229	732,391	73.0	270,399	174,272	88,715	55,741
Missouri-Illinois	May	172	206,083	2,081	209,802	47,317	41,736	3,493	76,180	173,484	82.7	36,318	21,432	17,947	19,534
	5 mos.	172	1,203,674	6,949	1,217,694	217,307	194,142	18,784	319,227	775,594	63.7	442,100	171,505	148,780	174,111
Missouri-Kansas-Texas Lines	May	3,253	5,534,190	1,148,200	7,186,015	1,711,590	831,085	132,815	2,072,222	4,979,382	69.3	2,206,633	928,880	461,160	—565,003
	5 mos.	3,273	24,419,262	5,396,358	32,296,622	6,656,784	4,123,442	661,141	9,921,247	22,564,052	69.9	9,732,570	5,217,492	3,280,461	2,512,025
Missouri Pacific	May	7,097	13,785,047	3,772,220	18,877,953	2,338,449	2,707,153	298,206	5,467,466	11,375,588	60.2	7,502,365	3,422,908	2,580,524	3,125,207
	5 mos.	7,097	70,598,008	17,815,566	95,007,225	10,603,294	13,068,843	1,494,493	27,336,320	55,244,409	58.1	39,762,816	17,977,480	13,744,350	18,806,604
Gulf Coast Lines	May	1,734	4,025,094	317,528	4,485,005	554,337	419,188	57,118	1,025,115	2,146,879	47.87	2,338,126	1,035,977	670,097	544,902
	5 mos.	1,734	19,971,446	1,702,230	22,389,355	2,823,738	1,810,579	288,803	4,874,776	10,247,720	45.78	12,141,635	5,211,390	3,494,326	2,777,144
International Great Northern	May	1,110	1,682,813	569,851	2,481,025	463,789	377,807	39,575	856,177	1,831,616	73.8	649,409	455,316	349,582	329,809
	5 mos.	1,110	8,919,566	2,558,897	12,642,201	2,126,190	1,725,581	179,401	4,096,650	8,626,304	68.2	4,015,897	2,311,055	1,444,629	1,910,552
Monongahela	May	170	574,576	1,963	581,942	72,497	49,374	491	140,946	266,815	45.8	315,127	191,157	102,833	114,437
	5 mos.	170	2,829,265	9,025	2,862,032	348,848	230,741	3,708	721,431	1,325,650	46.3	1,536,382	911,988	485,170	698,362

Table continued on third right-hand page

HSGI wear-resisting PARTS

ON GUARD
Against High Maintenance Costs

THE cost of renewing working parts because of rapid wear constitutes a large percentage of locomotive maintenance expenditures.

But, when parts such as cylinder bushings, valve chamber bushings, packing rings, bull rings etc., are made of HUNT-SPILLER *Air Furnace* GUN IRON, the rate of wear is greatly reduced, locomotives remain in service longer — fewer man-hours are required for their repair — and maintenance costs become less.

What will be the condition of your locomotives when the war is over?

Locomotives equipped now with HSGI wearing parts will be a valuable asset with which to start the post-war period.

HSGI
Reg. U. S. Trade Mark
Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings
Finished Parts
Dunbar Sectional Type Packing
Duplex Sectional Type Packing
for Cylinders and Valves
(Duplex Springs for Above
Sectional Packing)
Cylinder Snap Rings
Valve Rings, All Shapes
Light Weight Valves
Cylinder Liners and Pistons
for Diesel Service

HUNT-SPILLER MFG. CORPORATION
V. W. Ellet, *President* — E. J. Fuller, *Vice-Pres. & Gen. Mgr.*

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383 Dorchester Ave. — South Boston 27, Mass.

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Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.

HUNT-SPILLER *Air Furnace* GUN IRON

of becoming, sufficient to support its operation. This shipper cannot reasonably expect to be kept in business at the carrier's expense, and he has had sufficient time to adjust his affairs to a development which must have been recognized as inevitable, said the proposed report.

Railway Officers

EXECUTIVE

Ernest S. Marsh, chief clerk in the president's office of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, has been promoted to assistant to the president. Mr. Marsh was born in Lynchburg, Va., on January 10, 1903, and entered railway service on April 1, 1918, as a file clerk of the Santa Fe at Clovis, N. Mex. He advanced through the positions of assistant timekeeper, head timekeeper, assistant division accountant and division accountant at

Ernest S. Marsh

Clovis, N. Mex., and on May 12, 1932, was made head clerk in the division accounts bureau at Amarillo, Tex. Five years later he was promoted to general clerk in the auditor of disbursement's office at Topeka, Kan., where on January 1, 1940, he was made chief clerk and on July 1, 1940, was promoted to auditor of disbursements. On September 1, 1942, he was made chief clerk in the president's office at Chicago.

OPERATING

John A. Rogers, whose appointment as regional assistant general manager of the Canadian National's Central region was announced in the *Railway Age* of July 8, was born at Cayuga, Ont., and was graduated in civil engineering from the Royal Military College at Kingston, Ont., in 1904. He entered railway service the same year as draftsman of the Illinois Central at Chicago. After serving as engineering assistant of the National Transcontinental Railways, he became resident engineer of the Mackenzie Mann Company at Edmonton, Alta., in 1911. Mr. Rogers was division engineer of the Canadian Northern (now Canadian National) and the Canadian National at Saskatoon, Sask., from 1916 to 1927, when he became assistant superintendent at that location. In 1930 he was appointed superintendent at Prince Albert, Sask., being transferred to Hornepayne, Ont., that same year.

John A. Rogers

He also was superintendent at Allandale and Ottawa, Ont., and in 1942 was named general superintendent of transportation of the Central region, at Toronto. This position he held until his present appointment as assistant general manager of the Central region. **Oscar Masse,** whose promotion to the post of general superintendent of transportation of the Central region succeeding Mr. Rogers was announced in the July 8 *Railway Age,* was born November 6, 1884, at Coteau Station, Que. On November 1, 1901, he joined the Grand Trunk (now Canadian National) as clerk, serving in this capacity until 1903, when he became a telegraph operator. After successively filling the positions of train dispatcher, night chief dispatcher, chief train dispatcher, and acting trainmaster, he was named inspector of terminals in January, 1922. Mr. Masse was trainmaster from August, 1923, until May of the following year when he was ap-

Oscar Masse

pointed assistant superintendent. On December 1, 1927, he was named regional inspector of transportation, being promoted to superintendent of the Levis division in November, 1936. In 1939 he became superintendent of transportation, and in 1940 was advanced to general superintendent of the Quebec district. He continued in this latter capacity until his present appointment as regional general superintendent of transportation.

Alfred J. Lomas, whose new appointment as general superintendent of the Montreal district at Montreal also was reported in the July 8 *Railway Age,* was born at Derby, England, on February 17, 1888. On July 3, 1909, he entered the service of the Canadian Northern (now Canadian National) as a baggageman, subsequently being employed as a clerk in the office of the superintendent of transportation and in the bridge and building department, and as dock agent at Trenton and Key Harbor, Ont. In 1914, he again assumed the post of chief clerk, becoming yard agent in 1917 and agent the following year. Mr. Lomas was appointed yardmaster of the Capreol division in August, 1918. After serving as yardmaster and fuel supervisor at various locations, he became acting assistant superintendent at Hornepayne, Ont., and later at Capreol, Ont. From October, 1930, until 1940 Mr. Lomas was yardmaster and assistant superintendent at several points. He was appointed division superintendent at

Alfred J. Lomas

Capreol in February, 1940, being moved to Toronto two years later as superintendent of terminals. It was this post which he held until his recent promotion to general superintendent, Montreal district.

J. W. Harman has been appointed assistant superintendent, Laurentian division, of the Canadian Pacific.

R. C. Bunting has been appointed safety supervisor of the Southern Pacific with headquarters at San Francisco, Calif.

P. H. Fox, superintendent of the Ottawa division, Canadian National, has been appointed general superintendent of transportation of the Atlantic region to succeed **W. E. Robinson,** whose new position as general superintendent of the Northern Ontario district was announced in the July 8 *Railway Age.*

F. A. Pouliot, whose appointment as general manager of the Canadian Pacific was announced in the *Railway Age* of June 24, entered the service of the Canadian Pacific at Farnham, Que., in 1911 as a stenographer. Subsequently, in 1916, he was promoted to telegraph operator, and in 1918,

he was appointed train dispatcher. In 1937 he became chief train dispatcher of the Laurentian division at Montreal, and in 1940 he became supervisor of transportation at North Bay, Ont. Mr. Pouliot has also seen service as acting superintendent at Woodstock, N. B., and assistant to the general superintendent at Montreal. At the time of his present appointment he was superintendent of the Laurentian division at Mont-

F. A. Pouliot

real, a position which he held since May, 1943. **Gifford D. Wadsworth,** whose retirement as general manager also was announced in the *Railway Age* of June 24, was born at Sherbrooke, Que., on July 15, 1884. He entered the service of the Quebec Central (part of the Canadian Pacific) in 1899 as a messenger boy, then serving successively as stenographer and clerk in the car service and superintendent's office and the traffic department, and chief clerk in the traffic department. In March, 1916, Mr. Wadsworth became assistant general freight and passenger agent of the Quebec Central, being named general freight and passenger agent two years later. In 1928 he was appointed assistant general manager, and was

Gifford D. Wadsworth

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Joseph Alyre Breau has been appointed general agent, passenger department, of the Canadian National, at St. John, N. B. He was formerly rate clerk.

H. J. Reis has been appointed general freight agent of the Pittsburgh & West Virginia with headquarters at Pittsburgh, Pa. The position of assistant general freight agent, rates, has been abolished.

Donald Sutherland, general agent of the Union Pacific with headquarters at Minneapolis, Minn., has been appointed general agent, freight department, with headquarters at Portland, Ore., and has been succeeded by **Millard A. Light,** traveling freight and passenger agent at Tulsa, Okla.

C. W. Linker, district passenger agent of the Pennsylvania, with headquarters at Omaha, Neb., has been transferred to Atlanta, Ga., and has been succeeded by **Herman B. Peterson,** passenger representative at Detroit, Mich.

ENGINEERING & SIGNALING

H. C. Forman, division engineer of the Louisville & Nashville, with headquarters at Ravenna, Ky., has been appointed assistant engineer of the miscellaneous department with headquarters at Louisville and has been succeeded by **John U. Estes,** assistant division engineer at Birmingham, Ala., who in turn has been succeeded by **Walter E. Quinn,** assistant engineer at Louisville.

George H. Fair, division engineer of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., has been transferred to the Salt Lake division with headquarters at Ogden, Utah, to succeed **Jack Stewart,** deceased, and has been succeeded by **T. W. Saul,** division engineer of the Sacramento division with headquarters at Sacramento, Calif., who in turn has been succeeded by **W. F. Turner.**

Horace Waldo Flemming, whose appointment as district engineer of the North Ontario district, Canadian National, was reported in the *Railway Age* of July 8, was born at Liverpool, N. S. Beginning his railroad career in 1909 at Colbourne, Ont., as a rodman for the Canadian National, Mr. Flemming went to St. Prime, Ont., the following year, as resident engineer. He then served as transitman at Toronto, Ont., and Ottawa, Ont., and, from 1911 to 1919, as resident engineer of the James Bay & Eastern, Toronto-Hamilton, Toronto-Ottawa, and Hawkesbury-Montreal districts,

Horace Waldo Flemming

successively. In 1919 he became engineer in charge of the Ontario and Quebec lines of the Canadian National, being appointed resident engineer of the St. Lawrence district in 1920, and assistant engineer of that district the next year. He acted in a similar capacity at Toronto, Ottawa, and Hornepayne, Ont., until May, 1923, when he was named inspecting engineer at Toronto. In October, 1925, Mr. Flemming became division engineer at Hornepayne. He moved to Montreal, Que., in March, 1928, as assistant district engineer, maintaining that post until his recent promotion to the position of district engineer of the Northern Ontario district, with headquarters at North Bay. **Charles Herbert Newton Connell,** who has retired from the position of engineer of the Northern Ontario district, was born at Woodstock, N. B., and entered railroading in 1897 in the office of the division engineer, Crow's Nest Pass (now part of Canadian Pacific). In 1899 he became topographer on survey with the Ontario & Rainy River, and 1900 joined the Algoma Central & Hudson Bay as rodman and resident engineer. Two years later he went to Liverpool, N. S., as instrumentman on construction with the Halifax & South Western (now part of Canadian National), and in 1903 moved to Lethbridge, Alta., as engineer maintenance of way and chief engineer of the Alberta Railway and Irrigation Company. Mr. Connell was appointed district engineer of the Canadian National in 1909, at Quebec, serving in a like capacity at Toronto from January, 1921, to September, 1925, when he became district engineer of the Northern Ontario district with headquarters at North Bay. This post he held until his recent retirement.

MECHANICAL

George M. Duck has been appointed traveling master mechanic of the Gulf, Mobile & Ohio, with headquarters at Mobile, Ala.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1944

Name of road		Av. mileage operated during period	Operating revenues			Operating expenses					Operating ratio	Net from railway operation	Operating income	Net railway operating income	
						Maintenance of									
			Freight	Passenger	Total (inc. misc.)	Way and structures	Equipment	Traffic	Transportation	Total				1944	1943
Akron, Canton & Youngstown	May	171	$383,793	$179	$399,221	$60,443	$36,783	$17,359	$108,378	$242,931	60.9	$156,290	$96,579	$77,296	$101,944
	5 mos.	171	1,831,195	673	1,911,026	300,318	179,072	94,878	553,342	1,216,543	63.7	694,483	434,581	355,571	470,530
Alton	May	959	1,977,844	761,718	3,128,976	486,328	359,447	54,756	919,686	1,955,827	62.5	1,173,149	789,948	450,410	218,504
	5 mos.	959	9,821,278	3,665,320	15,153,840	1,993,228	2,124,490	333,093	5,067,558	10,169,588	67.1	4,984,252	3,228,525	1,984,846	2,187,724
Atchison, Topeka & Santa Fe System	May	13,093	29,346,675	9,991,635	42,493,579	6,483,733	6,730,020	632,447	11,513,921	25,982,809	61.1	16,510,770	4,582,144	4,063,981	5,485,506
	5 mos.	13,117	138,882,956	46,580,974	200,415,589	24,471,273	32,594,107	3,080,456	55,388,291	118,812,307	59.3	81,603,282	21,147,942	20,231,444	25,628,896
Atlanta & West Point	May	93	313,258	160,040	515,278	50,327	51,185	10,842	172,230	303,561	58.9	211,717	66,389	36,542	38,973
	5 mos.	93	1,350,163	767,226	2,331,373	224,786	271,102	48,991	780,007	1,422,006	61.0	909,367	291,840	161,370	206,199
Western of Alabama	May	133	332,457	160,932	528,799	58,364	68,874	11,291	156,314	311,704	58.9	217,095	62,358	52,784	55,275
	5 mos.	133	1,372,472	770,544	2,321,187	255,335	307,900	50,993	748,332	1,450,665	62.5	870,522	269,391	236,025	275,462
Atlanta, Birmingham & Coast	May	639	593,175	51,077	677,029	126,287	101,467	27,589	259,530	537,284	79.3	139,745	70,734	30,988	71,757
	5 mos.	639	2,821,621	232,813	3,214,310	553,728	508,419	142,542	1,225,717	2,541,018	79.0	673,292	337,501	150,776	437,749
Atlantic Coast Line	May	4,962	9,353,201	3,598,353	13,743,131	1,297,792	2,051,400	170,816	3,916,971	7,845,175	57.1	5,897,956	1,897,956	1,412,197	1,611,773
	5 mos.	4,962	45,693,321	19,336,816	69,339,447	5,814,190	9,818,962	938,652	19,333,203	37,906,940	54.7	31,432,507	9,932,507	7,370,976	9,223,170
Charleston & Western Carolina	May	343	400,545	13,030	422,367	59,085	59,539	10,094	122,613	258,038	61.1	164,329	94,329	90,229	88,083
	5 mos.	343	1,887,568	55,962	1,988,316	282,690	292,105	49,415	602,346	1,261,119	63.4	727,197	397,197	383,585	479,444
Baltimore & Ohio	May	6,156	27,500,166	4,328,849	33,359,089	4,916,339	6,716,295	551,549	10,824,474	24,098,772	72.2	9,260,317	5,039,794	4,061,413	6,163,275
	5 mos.	6,148	127,975,860	19,830,908	155,500,652	21,697,139	32,003,731	2,371,050	52,591,494	113,943,063	73.3	41,557,589	22,559,949	19,060,514	29,570,422
Staten Island Rapid Transit	May	24	319,991	113,424	442,441	50,676	39,226	1,261	117,039	235,648	53.3	206,793	129,488	108,610	74,359
	5 mos.	24	1,553,350	530,331	2,124,531	194,066	187,052	6,475	599,605	1,120,017	52.7	1,004,514	639,640	531,410	361,445
Bangor & Aroostook	May	602	573,873	69,025	670,413	146,792	117,064	6,941	180,343	487,376	72.7	183,037	81,400	111,127	48,580
	5 mos.	602	4,010,541	345,469	4,515,574	691,526	583,818	31,872	1,124,713	2,594,013	57.4	1,921,561	743,047	802,289	1,033,464
Bessemer & Lake Erie	May	214	2,328,374	1,821	2,345,185	155,515	759,773	13,747	380,288	1,368,611	58.4	976,574	652,014	804,155	419,163
	5 mos.	214	6,643,432	8,579	6,726,030	736,461	3,577,249	72,584	1,593,082	6,191,935	92.1	534,095	—24,792	1,062,039	—18,066
Boston & Maine	May	1,809	5,422,388	1,459,159	7,596,091	1,195,031	1,157,098	70,960	2,583,965	5,260,929	69.3	2,335,162	1,336,510	1,070,183	1,109,515
	5 mos.	1,817	25,182,258	7,443,208	35,846,305	5,723,523	6,163,769	370,507	13,349,396	26,809,102	74.8	9,037,203	5,247,614	3,807,604	5,479,874
Burlington, Rock Island	May	228	146,742	58,015	217,516	27,819	20,308	3,395	85,729	155,376	71.4	62,140	51,862	18,334	71,968
	5 mos.	228	702,656	313,559	1,081,720	131,561	120,282	15,770	360,438	703,218	65.0	378,502	332,097	199,130	284,439
Cambria & Indiana	May	35	159,948	.....	160,018	15,564	51,127	567	17,305	91,139	56.96	68,879	—28,294	53,138	24,600
	5 mos.	35	811,194	.....	811,513	50,614	240,562	2,990	102,270	431,676	53.19	379,837	—124,994	269,836	199,429
Canadian Pacific Lines in Maine	May	234	360,190	75,902	465,430	60,047	70,675	6,161	131,722	277,831	59.7	187,599	165,739	131,716	221,517
	5 mos.	234	2,315,849	372,294	2,830,476	231,398	401,505	31,216	840,969	1,563,629	55.2	1,266,847	1,155,473	967,472	852,744
Canadian Pacific Lines in Vermont	May	90	83,963	24,270	120,153	54,740	32,170	2,240	81,514	175,129	145.8	—54,976	—63,677	—92,525	—74,361
	5 mos.	90	438,347	86,520	585,455	172,489	168,374	11,418	462,875	842,173	143.8	—256,718	—302,954	—456,766	—352,018
Central of Georgia	May	1,815	2,308,105	685,937	3,286,024	421,072	511,457	68,671	1,176,441	2,316,747	70.5	969,277	703,147	653,091	696,269
	5 mos.	1,815	11,125,679	3,463,696	16,036,442	2,065,042	2,520,777	353,852	5,835,356	11,474,842	71.6	4,561,600	2,777,129	2,414,447	3,904,726
Central of New Jersey	May	655	4,450,553	598,825	5,339,548	778,900	907,355	58,042	2,121,473	4,028,928	75.5	1,310,620	782,070	466,543	865,529
	5 mos.	655	20,924,435	2,915,601	25,387,358	2,830,920	4,668,319	254,038	10,986,796	19,532,211	76.9	5,855,147	3,509,538	1,771,906	3,006,331
Central Vermont	May	422	600,110	66,000	724,800	114,035	112,512	10,679	290,953	553,515	76.4	171,285	127,650	88,806	148,979
	5 mos.	422	3,045,270	324,000	3,646,113	532,231	556,798	50,253	1,589,232	2,859,256	78.4	786,857	558,363	314,966	469,817
Chesapeake & Ohio	May	3,073	15,779,299	1,948,112	18,448,113	2,245,323	3,863,529	259,550	4,767,335	11,677,872	63.3	6,770,241	2,497,717	2,740,994	3,031,619
	5 mos.	3,073	77,460,971	10,050,460	90,553,967	10,474,646	17,706,975	1,223,692	23,645,059	55,960,798	61.8	34,593,169	12,076,064	13,847,808	15,487,357
Chicago & Eastern Illinois	May	912	2,142,239	659,292	3,062,955	395,013	442,940	72,653	1,082,761	2,111,409	68.9	951,546	632,546	363,688	321,208
	5 mos.	912	9,955,861	3,045,701	14,269,253	1,632,663	2,225,777	311,095	5,185,750	9,896,321	69.4	4,372,932	2,924,932	1,620,159	1,955,104
Chicago & Illinois Midland	May	131	646,792	1,649	678,356	69,540	93,649	22,439	144,760	359,836	53.0	318,520	92,842	88,853	69,463
	5 mos.	131	2,742,120	7,033	2,890,497	353,725	446,985	111,083	710,802	1,758,334	60.8	1,132,163	389,280	397,115	421,073
Chicago & North Western	May	8,077	9,577,399	3,023,498	13,858,481	1,863,258	2,645,084	217,747	4,624,169	9,850,481	71.1	4,008,000	2,129,116	2,206,000	2,847,030
	5 mos.	8,097	45,708,825	14,373,461	66,547,915	8,917,257	12,275,218	1,054,539	22,949,839	47,671,536	71.6	18,876,379	9,657,100	9,809,447	12,291,397
Chicago, Burlington & Quincy	May	8,991	14,734,991	3,363,740	19,695,241	3,670,328	2,769,142	255,843	5,052,100	12,382,129	62.9	7,313,112	2,236,980	2,088,029	5,150,009
	5 mos.	8,991	71,599,228	16,433,772	96,105,388	14,081,291	13,239,922	1,413,570	25,034,134	56,715,261	59.0	39,390,127	12,568,195	11,040,366	20,774,092
Chicago Great Western	May	1,500	2,237,776	223,798	2,646,920	389,491	323,048	63,536	920,712	1,769,930	66.9	876,990	446,525	288,483	298,161
	5 mos.	1,500	10,673,913	1,206,797	12,826,425	1,748,524	1,587,345	320,848	4,645,571	8,682,447	67.7	4,143,978	2,223,198	1,402,331	1,462,333
Chicago, Indianapolis & Louisville	May	541	999,597	125,081	1,204,632	128,322	184,332	32,236	356,945	743,800	61.7	460,832	298,263	266,857	250,358
	5 mos.	541	4,802,433	543,108	5,757,544	572,582	935,668	161,866	1,781,162	3,653,500	63.5	2,104,044	1,500,641	1,289,905	1,424,966

REVENUES AND EXPENSES OF RAILWAYS

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1944—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: 1944	1943
Chicago, Milwaukee, St. Paul & Pacific	May	10,722	$13,989,260	$2,702,892	$18,456,264	$3,388,250	$2,911,148	$286,190	$6,065,492	$13,320,915	72.2	$5,135,349	$2,846,349	$2,560,067	$5,084,064
	5 mos.	10,733	69,687,121	12,557,786	90,315,402	13,507,678	14,069,270	1,298,145	30,742,941	62,981,867	69.7	27,333,535	13,923,535	12,699,825	23,983,893
Chicago, Rock Island & Pacific	May	7,751	10,452,449	3,684,611	15,341,582	2,043,672	2,158,563	335,946	4,464,006	9,617,186	62.7	5,724,396	3,021,992	2,508,890	3,457,045
	5 mos.	7,751	51,418,477	17,698,938	74,901,533	8,627,771	10,754,978	1,673,726	22,181,240	46,320,429	61.8	28,581,104	14,322,661	11,896,285	19,020,658
Chicago, St. Paul, Minneapolis & Omaha	May	1,617	1,608,521	351,417	2,151,141	315,702	361,289	40,457	917,800	1,721,601	80.0	429,540	278,011	226,980	450,374
	5 mos.	1,617	8,543,501	1,674,708	11,175,189	1,517,232	1,689,150	197,571	4,875,364	8,687,584	77.7	2,487,605	1,612,863	1,282,884	1,921,782
Clinchfield	May	302	1,238,399	11,033	1,257,144	78,099	197,382	22,058	231,476	549,253	43.7	707,891	579,962	599,045	439,487
	5 mos.	302	6,028,135	51,644	6,123,055	405,885	938,159	117,147	1,241,612	2,809,365	45.9	3,313,690	2,675,206	2,725,836	2,499,938
Colorado & Southern	May	748	925,017	361,130	1,382,730	168,381	246,516	17,250	413,193	891,505	64.5	491,225	301,711	257,349	270,001
	5 mos.	748	4,388,146	1,594,042	6,480,859	669,265	1,073,338	86,975	1,969,123	4,027,034	62.1	2,453,825	1,519,530	1,301,407	1,286,712
Fort Worth & Denver City	May	804	661,479	450,000	1,215,277	237,143	138,696	25,619	321,078	789,351	65.0	425,926	245,748	209,143	241,953
	5 mos.	804	3,411,908	2,220,432	6,147,048	1,131,482	677,175	121,094	1,603,116	3,838,407	62.4	2,308,641	1,338,077	1,141,025	1,337,397
Colorado & Wyoming	May	42	90,462	.....	143,789	13,823	20,894	701	55,288	95,364	66.3	48,425	34,394	33,452	22,055
	5 mos.	42	451,200	.....	733,665	54,874	98,826	3,465	288,468	468,704	63.8	264,961	185,296	181,149	115,221
Columbus & Greenville	May	168	108,223	12,260	129,120	28,437	16,552	4,804	43,987	109,000	84.4	20,120	4,556	7,931	—6,328
	5 mos.	168	532,205	59,053	637,049	123,216	87,014	22,513	214,076	515,827	81.0	121,222	38,863	48,717	43,711
Delaware & Hudson	May	846	4,125,859	165,754	4,388,732	492,401	1,100,375	47,324	1,412,179	3,165,510	72.1	1,223,222	719,346	705,625	716,690
	5 mos.	847	20,214,087	879,424	21,573,128	2,265,948	5,210,283	234,884	7,310,704	15,604,013	72.3	5,969,115	4,038,794	3,962,178	3,495,042
Delaware, Lackawanna & Western	May	973	5,301,545	888,138	6,847,759	725,250	1,101,413	119,718	2,695,411	4,822,285	70.4	2,025,474	941,474	879,017	1,317,560
	5 mos.	973	25,300,179	4,280,796	32,637,536	3,495,009	5,454,419	579,154	13,566,426	23,999,753	73.5	8,637,783	4,032,783	3,564,601	5,502,361
Denver & Rio Grande Western	May	2,391	4,833,974	816,019	5,892,812	715,609	1,142,115	101,674	1,668,113	3,815,561	64.7	2,077,251	1,785,835	1,747,096	1,584,454
	5 mos.	2,396	23,061,154	4,073,047	28,320,556	3,355,510	5,667,552	495,474	8,558,258	19,041,759	67.2	9,278,797	6,636,350	6,258,647	7,054,147
Denver & Salt Lake	May	232	242,178	7,727	259,740	58,307	54,841	2,833	88,601	216,261	83.3	43,479	13,435	63,106	90,597
	5 mos.	232	1,265,340	43,681	1,357,212	276,156	270,879	13,421	466,598	1,086,229	80.0	270,983	122,349	366,388	464,062
Detroit & Mackinac	May	230	67,466	9,470	84,199	21,751	17,163	832	31,405	75,048	89.1	9,151	5,702	3,722	1,082
	5 mos.	230	305,169	44,292	388,642	76,989	87,916	4,193	157,058	345,918	89.0	42,724	21,751	11,431	17,036
Detroit & Toledo Shore Line	May	50	322,464	.....	323,711	37,323	24,363	9,604	101,528	181,453	56.1	142,258	100,164	53,358	58,480
	5 mos.	50	1,988,282	.....	1,994,299	169,537	127,807	47,808	539,506	928,107	46.5	1,066,192	593,577	311,926	429,518
Detroit, Toledo & Ironton	May	464	687,926	1,515	724,921	90,537	133,054	16,410	177,974	443,196	61.1	281,725	148,926	154,207	155,993
	5 mos.	464	3,868,638	6,277	4,088,212	434,884	620,594	76,244	1,002,646	2,261,415	55.3	1,826,797	1,035,181	1,002,921	1,152,178
Duluth, Missabe & Iron Range	May	545	4,944,234	4,378	5,741,863	391,860	556,836	5,263	934,532	1,929,405	33.6	3,812,458	2,929,262	2,926,922	3,032,527
	5 mos.	545	8,170,465	24,979	9,523,477	1,828,372	2,717,055	22,137	2,438,228	7,199,534	75.6	2,323,943	961,712	1,084,408	342,297
Duluth, Winnipeg & Pacific	May	175	336,300	3,300	344,400	56,446	33,154	2,096	123,089	218,930	63.6	125,470	100,290	63,125	9,516
	5 mos.	175	1,590,300	15,500	1,628,300	223,519	168,217	10,101	643,059	1,065,563	65.4	562,737	445,497	244,710	89,726
Elgin, Joliet & Eastern	May	392	2,521,609	4	2,946,454	300,528	788,811	17,139	1,034,064	2,204,475	74.8	741,979	300,450	259,469	95,556
	5 mos.	392	12,283,431	51	14,164,428	1,308,496	3,814,281	83,899	5,194,568	10,726,204	75.7	3,438,224	1,541,277	1,213,876	596,505
Erie	May	2,244	11,523,895	946,041	13,339,177	1,333,570	2,321,597	234,567	4,682,323	9,019,560	67.6	4,319,617	2,053,562	1,428,207	2,102,407
	5 mos.	2,244	57,876,204	4,983,325	66,856,014	5,961,390	11,352,186	1,132,456	24,487,525	45,111,668	67.5	21,744,346	10,409,867	7,133,845	8,910,434
Florida East Coast	May	682	1,449,243	1,328,532	2,961,806	390,455	296,648	48,713	806,767	1,684,145	56.9	1,277,661	659,489	539,098	1,071,736
	5 mos.	682	8,608,708	6,058,861	15,741,041	1,716,542	1,428,340	245,518	4,065,792	8,099,697	51.5	7,641,344	4,106,929	3,426,170	4,764,228
Georgia Railroad	May	329	754,385	141,949	936,823	100,916	121,929	20,234	321,991	584,566	62.4	352,257	319,686	310,634	352,363
	5 mos.	329	3,319,092	801,569	4,343,982	458,995	580,243	107,052	1,541,689	2,799,094	64.4	1,544,888	1,373,084	1,354,968	1,790,896
Georgia & Florida	May	408	175,052	6,397	186,251	52,842	24,280	10,411	71,167	166,410	89.3	19,841	8,767	—504	31,134
	5 mos.	408	905,815	33,436	965,385	249,071	121,515	51,973	330,310	790,241	81.9	175,144	122,142	68,772	91,133
Grand Trunk Western	May	1,026	2,491,000	282,000	2,993,000	538,592	501,171	37,954	1,143,721	2,339,247	78.2	653,753	438,144	395,947	439,199
	5 mos.	1,026	12,395,000	1,512,000	14,873,000	2,400,185	2,459,918	180,096	5,740,451	11,325,266	76.2	3,547,734	2,410,300	2,238,053	3,003,207
Canadian National Lines in New England	May	172	112,700	8,300	141,200	45,090	27,279	2,308	94,139	191,419	135.6	—50,219	—71,664	—104,258	—119,866
	5 mos.	172	611,800	40,900	795,500	210,335	171,438	11,453	476,200	969,147	121.8	—173,647	—280,872	—464,485	—473,617
Great Northern	May	8,372	14,631,303	1,774,939	17,678,550	3,547,268	2,919,282	216,510	4,386,205	11,551,980	65.3	6,126,570	2,389,481	2,161,239	2,635,693
	5 mos.	8,373	65,929,737	7,952,366	79,169,374	13,411,391	14,328,056	1,054,274	22,642,603	53,743,741	67.9	25,125,633	10,003,195	9,246,258	9,717,725
Green Bay & Western	May	234	235,440	607	241,525	94,032	27,051	8,501	71,948	209,101	86.5	32,424	—6,329	—11,818	64,853
	5 mos.	234	1,150,089	2,706	1,186,583	322,161	118,214	41,777	343,294	863,959	82.8	322,624	149,170	124,347	272,924
Gulf & Ship Island	May	259	110,140	50,088	182,752	51,612	28,873	3,017	87,587	180,269	98.6	2,483	—16,119	—30,311	—71,994
	5 mos.	259	864,207	253,735	1,230,414	223,312	114,495	12,933	446,596	845,254	68.7	385,160	289,333	221,573	—101,912

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1944—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: 1944	1943
Gulf, Mobile & Ohio	May	1,973	$2,832,816	$219,779	$3,175,546	$511,662	$537,666	$81,711	$907,687	$2,159,310	68.0	$1,016,236	$559,833	$381,375	$331,962
	5 mos.	1,973	13,803,745	1,109,514	15,427,853	2,508,893	2,598,148	399,178	4,267,341	10,354,654	67.1	5,073,199	2,666,430	1,919,009	2,191,960
Illinois Central	May	4,823	14,972,039	3,438,480	19,605,100	2,806,777	3,263,731	173,078	5,255,880	12,124,996	61.8	7,480,104	2,979,372	2,658,742	2,711,572
	5 mos.	4,823	71,157,998	15,187,028	92,066,157	11,973,438	16,221,774	939,524	26,369,560	58,617,966	63.7	33,448,191	13,399,206	11,908,194	14,667,428
Yazoo & Mississippi Valley	May	1,524	2,070,779	449,759	2,669,301	487,862	321,301	26,606	953,834	1,880,260	70.4	789,041	348,332	231,958	987,309
	5 mos.	1,524	11,410,013	2,115,097	14,326,295	2,150,827	1,625,030	149,643	4,746,778	9,132,463	63.7	5,193,832	2,348,952	1,833,443	3,341,947
Illinois Central System	May	6,347	17,042,818	3,888,239	22,274,401	3,294,639	3,585,032	199,684	6,209,714	14,005,256	62.9	8,269,145	3,321,728	2,896,614	3,698,794
	5 mos.	6,347	82,568,011	17,302,125	106,392,452	14,124,265	17,846,804	1,089,167	31,116,338	67,750,429	63.7	38,642,023	15,723,850	13,764,202	18,017,939
Illinois Terminal	May	476	637,754	177,595	893,745	109,236	100,925	19,584	277,744	531,430	59.46	362,315	139,692	106,928	112,774
	5 mos.	476	3,416,766	869,183	4,679,062	471,466	460,295	98,895	1,422,944	2,586,043	55.27	2,093,019	730,034	583,234	572,193
Kansas City Southern	May	878	3,240,859	403,429	3,822,226	518,440	501,479	62,061	990,168	2,214,352	57.9	1,607,874	729,874	464,410	222,673
	5 mos.	878	15,336,794	2,257,060	18,583,977	2,612,377	2,505,888	310,639	5,026,467	11,100,123	59.7	7,483,854	3,558,854	2,357,144	2,769,259
Kansas, Oklahoma & Gulf	May	328	353,770	1,775	338,048	45,399	21,508	9,657	75,072	162,870	45.5	195,178	109,177	89,483	1,583
	5 mos.	328	1,707,568	7,910	1,730,366	189,384	109,704	46,688	394,345	794,392	45.9	935,974	521,123	402,942	397,916
Lake Superior & Ishpeming	May	156	265,916	135	355,438	41,193	28,203	544	69,394	147,101	41.4	208,337	175,609	182,228	188,873
	5 mos.	156	564,843	680	722,524	140,095	194,760	2,852	216,760	595,329	82.4	127,195	—10,197	31,295	—67,686
Lehigh & Hudson River	May	96	295,077	.....	295,461	55,651	37,184	5,478	84,636	190,073	64.3	105,388	49,187	23,940	24,693
	5 mos.	96	1,475,019	1,653	1,480,775	225,362	171,981	26,493	435,435	895,337	60.5	585,438	241,208	130,848	151,736
Lehigh & New England	May	190	541,793	.....	544,796	53,555	126,604	7,685	156,312	367,367	67.4	177,429	107,630	122,511	143,780
	5 mos.	190	2,619,542	.....	2,634,442	244,363	603,278	38,988	775,280	1,765,070	67.0	869,372	482,194	537,859	594,597
Lehigh Valley	May	1,260	8,080,436	702,704	9,221,962	1,193,137	1,377,200	122,073	3,214,264	6,116,055	66.3	3,105,907	1,427,186	921,767	875,128
	5 mos.	1,260	36,069,224	3,582,078	41,823,089	5,644,021	6,533,272	605,908	15,658,364	29,522,458	70.6	12,300,631	6,438,287	4,152,526	5,516,607
Louisiana & Arkansas	May	834	1,472,068	158,460	1,691,716	388,869	182,242	32,844	366,947	1,032,463	61.0	659,253	225,887	154,275	203,684
	5 mos.	834	7,171,824	761,943	8,240,201	1,805,847	898,069	177,614	1,808,653	5,005,949	60.8	3,234,252	1,175,818	840,034	999,535
Louisville & Nashville	May	4,745	13,389,076	3,862,262	18,308,657	1,980,410	2,980,040	216,075	5,365,127	11,076,377	60.5	7,232,280	1,952,732	2,134,019	2,211,859
	5 mos.	4,745	64,396,653	18,638,468	88,339,686	9,725,657	15,127,942	1,005,451	25,423,680	54,199,270	61.4	34,140,416	8,988,125	10,308,293	10,989,234
Maine Central	May	988	1,230,484	275,243	1,632,115	253,794	276,998	10,670	535,351	1,123,991	68.9	508,124	163,141	165,683	205,157
	5 mos.	988	6,297,977	1,490,492	8,334,091	1,444,656	1,404,189	64,380	2,970,336	6,131,506	73.6	2,202,585	1,047,328	844,549	1,351,237
Midland Valley	May	334	141,283	37	143,583	42,396	12,271	2,324	47,440	109,081	76.0	34,502	26,997	17,242	22,218
	5 mos.	334	690,462	1,001	701,403	137,762	60,454	11,919	232,929	467,115	66.6	234,288	159,766	102,303	221,279
Minneapolis & St. Louis	May	1,408	1,089,398	35,261	1,172,108	257,581	165,823	64,907	375,261	922,909	78.7	249,199	111,257	95,744	259,474
	5 mos.	1,408	5,600,498	185,050	6,019,190	1,079,736	863,355	330,597	1,925,261	4,487,220	74.5	1,531,970	749,866	724,476	1,558,475
Minneapolis, St. Paul & Sault Ste. Marie	May	4,277	4,103,785	221,709	4,634,771	731,475	777,896	75,581	1,528,188	3,247,861	70.1	1,386,910	1,104,262	1,080,103	713,455
	5 mos.	4,277	19,229,426	1,100,759	21,645,675	3,045,210	3,534,542	364,062	7,816,492	15,386,802	71.1	6,258,873	4,840,494	4,543,015	2,703,955
Duluth, South Shore & Atlantic	May	551	270,141	23,302	316,649	65,824	59,052	8,110	131,350	272,358	86.0	44,291	24,273	25,057	111,304
	5 mos.	551	1,528,535	139,381	1,768,378	306,326	273,377	43,019	672,989	1,336,170	75.6	432,208	349,435	317,354	299,646
Spokane International	May	152	186,399	10,729	204,772	35,937	15,670	3,630	54,710	116,777	57.0	87,995	44,279	31,265	24,930
	5 mos.	152	790,575	48,856	880,111	230,054	71,849	17,296	249,354	602,947	68.5	277,164	163,565	103,217	151,890
Mississippi Central	May	158	187,821	2,873	193,151	31,695	16,260	8,809	48,077	111,903	57.9	81,248	52,618	37,501	21,660
	5 mos.	158	902,978	28,154	943,006	148,084	83,048	44,722	255,697	569,057	60.3	373,949	239,949	171,278	140,458
Missouri & Arkansas	May	365	218,948	3,634	230,945	45,208	23,076	7,470	65,832	148,793	64.4	82,152	51,879	35,585	—17,885
	5 mos.	365	938,521	18,001	1,002,790	220,761	110,224	37,413	330,229	732,391	73.0	270,399	174,272	88,715	55,741
Missouri-Illinois	May	172	206,083	2,081	209,802	47,317	41,736	3,493	76,180	173,484	82.7	36,318	21,432	17,947	19,534
	5 mos.	172	1,203,674	6,949	1,217,694	217,307	194,142	18,784	319,227	775,594	63.7	442,100	171,505	148,780	174,111
Missouri-Kansas-Texas Lines	May	3,253	5,534,190	1,148,200	7,186,015	1,711,590	831,085	132,815	2,072,222	4,979,382	69.3	2,206,633	928,880	461,160	—565,003
	5 mos.	3,273	24,419,262	5,396,358	32,296,622	6,656,784	4,123,442	661,141	9,921,247	22,564,052	69.9	9,732,570	5,217,492	3,280,461	2,512,025
Missouri Pacific	May	7,097	13,785,047	3,772,220	18,877,953	2,338,449	2,707,153	298,206	5,467,466	11,375,588	60.2	7,502,365	3,422,908	2,580,524	3,125,207
	5 mos.	7,097	70,598,008	17,815,566	95,007,225	10,603,294	13,068,843	1,494,493	27,336,320	55,244,409	58.1	39,762,816	17,977,480	13,744,350	18,806,604
Gulf Coast Lines	May	1,734	4,025,094	317,528	4,485,005	554,337	419,188	57,118	1,025,115	2,146,879	47.87	2,338,126	1,035,977	670,097	544,902
	5 mos.	1,734	19,971,446	1,702,230	22,389,355	2,823,738	1,810,579	288,803	4,874,776	10,247,720	45.78	12,141,635	5,211,390	3,494,326	2,777,144
International Great Northern	May	1,110	1,682,813	569,851	2,481,025	463,789	377,807	39,575	856,177	1,831,616	73.8	649,409	455,316	349,582	329,809
	5 mos.	1,110	8,919,566	2,558,897	12,642,201	2,126,190	1,725,581	179,401	4,096,650	8,626,304	68.2	4,015,897	2,311,055	1,444,629	1,910,552
Monongahela	May	170	574,576	1,963	581,942	72,497	49,374	491	140,946	266,815	45.8	315,127	191,157	102,833	114,437
	5 mos.	170	2,829,265	9,025	2,862,032	348,848	230,741	3,708	721,431	1,325,650	46.3	1,536,382	911,988	485,170	698,362

Table continued on third right-hand page

HSGI wear-resisting PARTS

ON GUARD
Against High Maintenance Costs

THE cost of renewing working parts because of rapid wear constitutes a large percentage of locomotive maintenance expenditures.

But, when parts such as cylinder bushings, valve chamber bushings, packing rings, bull rings etc., are made of HUNT-SPILLER *Air Furnace* GUN IRON, the rate of wear is greatly reduced, locomotives remain in service longer — fewer man-hours are required for their repair — and maintenance costs become less.

What will be the condition of your locomotives when the war is over?

Locomotives equipped now with HSGI wearing parts will be a valuable asset with which to start the post-war period.

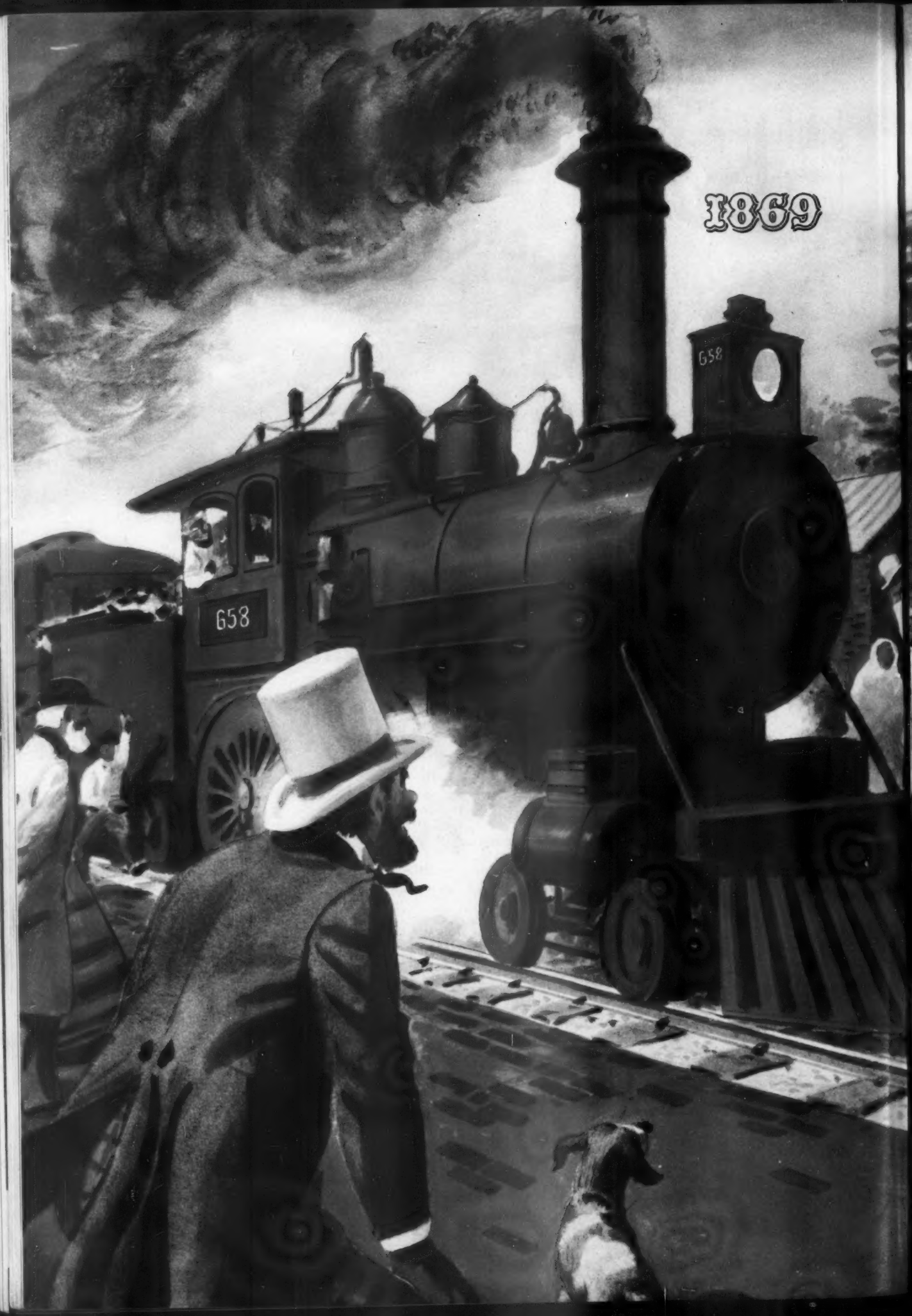
HSGI
Reg. U. S. Trade Mark
Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings
Finished Parts
Dunbar Sectional Type Packing
Duplex Sectional Type Packing
for Cylinders and Valves
(Duplex Springs for Above
Sectional Packing)
Cylinder Snap Rings
Valve Rings, All Shapes
Light Weight Valves
Cylinder Liners and Pistons
for Diesel Service

HUNT-SPILLER MFG. CORPORATION
V. W. Ellet, *President* — E. J. Fuller, *Vice-Pres. & Gen. Mgr.*

Office & Works
383 Dorchester Ave. — South Boston 27, Mass.

Canadian Representative: Joseph Robb & Co., Ltd., 5575 Cote St. Paul Rd., Montreal, P. Q.
Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.

HUNT-SPILLER *Air Furnace* GUN IRON


1869
658
658

WHEN THIS TRAIN STOPPED-

IT STARTED SOMETHING!

Probably no other American invention ever gave a more immediate demonstration of its value, or won quicker acceptance, than the Westinghouse Air Brake.

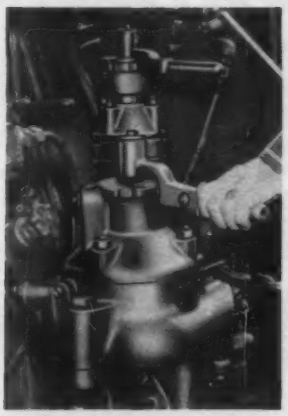
The first equipment, built in Pittsburgh shops, was installed on the Panhandle's Steubenville accommodation. The train, carrying a number of prominent railroad men, pulled out of the Pittsburgh Terminal. It was rolling at 30 miles per hour when the engineer saw a drayman's cart stalled on a crossing a few hundred feet ahead, and the driver lying on the tracks.

The engineer applied the air. Brakes screeched, prominent railroad men sprawled on the floor, and the train ground to a stop—inches away from the helpless drayman.

Within two years, 22 railroads had installed Westinghouse Air Brakes. Within three years, it was in use abroad. Today there is not a railroad in this country, and very few anywhere on the globe, that do not include the air brake as an essential part of their equipment.

75 Years of Pioneering

WESTINGHOUSE AIR BRAKE COMPANY, WILMERDING, PA.



The simplicity, power, and reliability that mark every new Westinghouse Air Brake development are well illustrated in the No. 8-ET. Unusual operating characteristics permit the engineman to handle trains with remarkable smoothness. Structural design is particularly emphasized, to provide long, maintenance-free service life. Many roads are applying this equipment to older locomotives, to step up performance possibilities. Westinghouse Braking Equipment is always abreast of transportation needs.

1869

1944

TO PERMIT TODAY'S TRAINS TO MOVE AT SHORTER INTERVALS WITH HEAVIER LOADS AT HIGHER SPEEDS—SAFELY.

More railroads are equipping locomotives

with

HANNA STOKERS

because—

of their firing reliability.

This means continuous high firebox temperatures and maximum horsepower.

THE HANNA STOKER COMPANY

Cincinnati 27, Ohio

REVENUES AND EXPENSES OF RAILWAYS

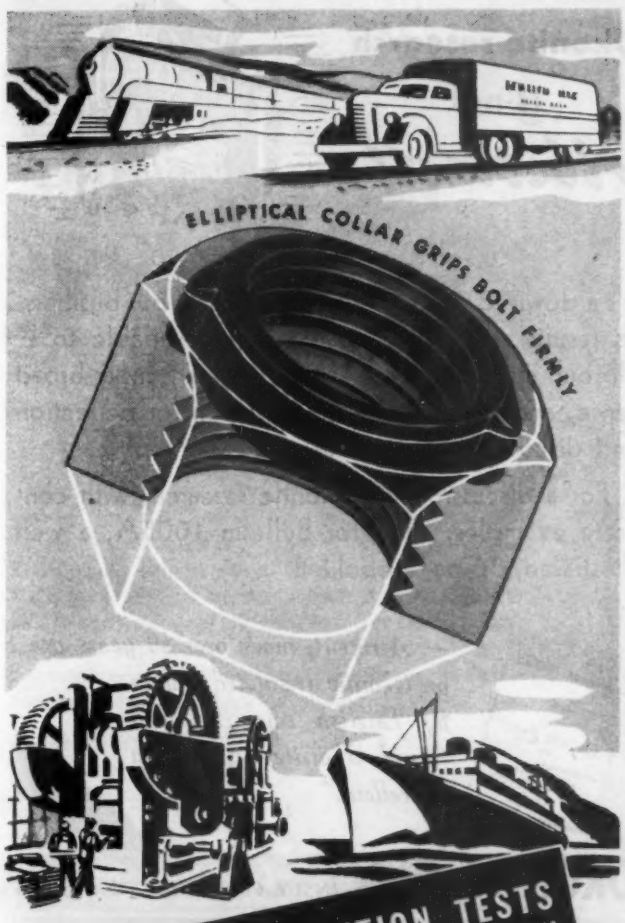
MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1944—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: 1944	1943
Montour	May	51	$278,893	.....	$279,685	$17,944	$68,989	$906	$71,600	$167,407	59.9	$112,278	$40,150	$77,493	$74,614
	5 mos.	51	1,217,923	.....	1,223,898	78,683	328,403	4,886	363,457	815,953	66.7	407,945	114,613	304,239	325,526
Nashville, Chattanooga & St. Louis	May	1,072	2,867,963	720,207	3,839,700	622,029	748,316	88,590	1,062,857	2,645,457	68.9	1,194,243	223,587	211,649	379,933
	5 mos.	1,072	13,151,473	3,462,530	17,945,784	2,968,355	3,499,341	394,287	5,469,703	12,871,797	71.7	5,073,987	2,312,904	2,132,931	2,699,304
New York Central	May	10,746	41,223,143	15,469,458	62,140,897	8,288,649	10,870,436	705,370	21,184,006	43,237,537	69.6	18,903,360	7,450,510	5,888,176	7,758,212
	5 mos.	10,746	197,332,947	71,326,707	295,132,599	40,712,579	53,532,092	3,464,798	107,963,502	216,921,838	73.5	78,210,761	34,928,174	26,342,167	38,513,932
Pittsburgh & Lake Erie	May	229	2,894,273	102,717	3,088,259	351,361	981,800	47,167	938,065	2,427,059	78.6	661,200	—69,656	422,714	602,249
	5 mos.	229	13,563,607	513,405	14,532,383	1,561,798	4,624,309	221,408	4,670,643	11,621,174	80.0	2,911,209	—592,083	2,110,808	2,893,762
New York, Chicago & St. Louis	May	1,688	7,954,024	297,673	8,394,591	884,057	1,248,265	141,987	2,504,851	5,004,225	59.6	3,390,366	1,394,787	934,194	1,118,666
	5 mos.	1,688	39,686,941	1,951,918	42,389,925	4,219,567	3,503,799	682,209	13,128,431	25,053,952	59.1	17,335,973	7,234,521	4,698,452	5,734,895
New York, New Haven & Hartford	May	1,838	8,620,729	6,497,304	16,245,873	2,127,879	2,274,825	142,962	5,177,375	10,457,110	64.4	5,788,763	3,779,771	2,652,244	3,301,153
	5 mos.	1,838	40,888,359	29,245,305	75,861,961	9,648,926	11,262,632	767,840	26,575,395	51,835,021	68.3	24,026,940	15,806,364	10,379,063	14,067,603
New York Connecting	May	21	246,551	.....	269,410	102,283	11,823	.....	49,817	165,916	61.6	103,494	—46,274	113,076	106,844
	5 mos.	21	1,058,467	.....	1,183,077	322,692	64,732	.....	266,784	664,689	56.2	518,388	787	664,019	556,795
New York, Ontario & Western	May	546	795,317	26,298	875,121	97,124	163,409	23,611	454,442	766,621	87.6	108,500	63,915	9,473	26,986
	5 mos.	546	3,407,552	104,152	3,819,973	426,643	744,769	113,320	2,173,471	3,593,464	94.1	226,509	22,357	—204,099	—35,684
New York, Susquehanna & Western	May	120	405,544	35,878	455,635	39,015	55,870	6,463	165,146	283,585	62.2	172,050	113,676	59,024	112,920
	5 mos.	120	2,326,643	173,644	2,574,749	177,034	255,219	24,305	904,185	1,441,909	56.0	1,132,840	758,608	391,638	462,187
Norfolk & Western	May	2,154	11,522,914	1,446,214	13,335,484	1,435,092	2,576,130	170,488	2,956,001	7,472,017	56.0	5,863,467	1,675,848	2,225,808	1,943,318
	5 mos.	2,154	56,122,669	6,966,954	65,164,356	7,292,959	13,239,375	786,053	14,507,857	37,612,168	57.7	27,552,188	7,309,351	10,724,220	9,768,135
Norfolk Southern	May	727	605,035	18,933	645,291	162,012	83,098	31,419	225,900	531,287	82.3	114,004	63,490	39,403	84,079
	5 mos.	727	3,038,884	121,202	3,268,764	838,360	399,703	137,253	1,159,020	2,663,490	81.5	605,274	357,314	228,152	404,038
Northern Pacific	May	6,867	10,025,736	1,857,285	12,938,301	1,926,343	2,493,281	181,435	3,631,481	8,784,120	67.9	4,154,181	1,374,473	1,858,452	2,467,058
	5 mos.	6,867	47,995,039	8,617,113	61,639,349	8,340,673	12,183,538	888,085	18,455,754	42,746,999	69.4	18,892,350	6,687,042	8,611,101	11,666,007
Northwestern Pacific	May	331	484,276	21,491	524,713	170,845	60,530	3,713	173,206	414,933	79.1	109,780	85,001	61,320	144,139
	5 mos.	331	2,241,414	85,965	2,425,458	870,955	298,040	13,975	791,120	2,007,477	82.8	417,981	279,950	172,280	341,461
Oklahoma City-Ada-Atoka	May	132	147,453	101	148,947	18,739	4,669	1,143	31,123	59,863	40.2	89,084	56,538	43,887	16,687
	5 mos.	132	655,753	2,717	666,147	93,452	25,057	6,457	149,087	296,606	44.5	369,541	216,360	147,566	107,374
Pennsylvania	May	10,099	58,851,109	21,659,287	86,952,755	10,272,659	16,142,216	974,377	32,537,223	62,628,332	72.0	24,324,423	10,166,552	8,897,663	14,706,120
	5 mos.	10,102	279,974,497	105,010,607	414,582,497	47,306,977	78,725,738	5,139,008	163,871,885	308,996,587	74.5	105,585,910	46,932,793	41,500,636	50,874,374
Long Island	May	376	1,205,103	2,458,766	3,839,312	634,082	580,155	12,506	1,607,998	2,886,740	75.2	952,572	480,283	243,226	457,092
	5 mos.	376	6,021,856	10,252,790	17,144,550	2,937,256	2,773,327	111,152	8,084,193	14,186,389	82.7	2,958,161	1,261,826	67,650	338,162
Pennsylvania-Reading Seashore Lines	May	392	567,511	393,608	994,106	181,270	106,892	10,748	451,633	773,116	77.8	220,990	118,884	9,044	49,232
	5 mos.	392	2,512,121	1,323,340	4,000,668	810,665	509,766	39,497	2,243,544	3,717,130	92.9	283,538	—176,111	—684,992	—337,667
Pere Marquette	May	1,979	4,458,045	297,245	4,957,221	838,409	854,478	72,022	1,700,537	3,640,348	73.4	1,316,873	494,732	398,377	463,051
	5 mos.	1,979	20,924,561	1,522,080	23,412,674	3,784,745	4,094,129	359,330	8,336,826	17,487,890	74.7	5,924,784	2,267,069	1,918,147	3,009,024
Pittsburg & Shawmut	May	97	135,198	.....	135,943	39,085	25,958	1,812	35,568	108,220	79.6	27,723	16,833	16,768	22,296
	5 mos.	97	641,829	.....	645,039	136,202	122,318	9,683	177,628	476,525	73.9	168,514	129,386	122,517	110,531
Pittsburgh & West Virginia	May	136	589,083	44	607,594	99,057	112,551	20,946	149,777	410,501	67.5	197,093	116,703	141,005	191,289
	5 mos.	136	2,855,177	70	2,947,451	448,988	584,525	106,676	734,566	2,007,063	68.1	940,388	567,199	696,969	782,399
Pittsburg, Shawmut & Northern	May	190	112,034	.....	113,254	26,714	27,715	1,037	46,404	107,709	95.1	5,545	—1,482	—7,824	9,316
	5 mos.	190	540,231	.....	555,714	117,804	121,535	5,451	238,774	513,396	92.4	42,318	7,963	—22,196	71,657
Reading	May	1,410	8,623,318	865,909	9,907,528	1,341,299	1,934,975	83,204	3,243,002	6,790,498	68.5	3,117,030	1,320,247	1,297,497	1,608,068
	5 mos.	1,413	42,505,472	4,205,995	48,934,158	5,567,518	9,370,091	413,310	17,088,716	33,428,655	68.3	15,505,503	7,210,088	6,386,542	8,767,223
Richmond, Fredericksburg & Potomac	May	118	1,599,427	1,286,783	3,159,325	221,993	373,352	13,976	787,884	1,524,278	48.2	1,635,047	445,521	263,739	338,616
	5 mos.	118	7,971,248	6,815,068	16,187,336	956,490	1,725,313	69,063	3,900,063	7,238,875	44.7	8,948,461	2,375,520	1,452,149	1,742,640
Rutland	May	407	314,611	57,285	435,870	61,481	81,213	10,749	200,211	367,175	84.2	68,695	43,379	45,994	5,738
	5 mos.	407	1,400,507	269,057	1,973,385	291,087	430,050	58,483	1,019,950	1,874,257	95.0	99,128	—26,558	—19,759	82,802
St. Louis-San Francisco	May	4,646	7,096,566	2,007,683	9,770,794	1,368,392	1,788,293	170,927	3,122,992	6,801,410	69.6	2,969,384	1,290,939	1,210,202	1,361,259
	5 mos.	4,654	33,171,577	9,723,190	46,187,592	6,420,834	8,663,293	834,064	15,200,327	32,809,142	71.0	13,378,450	6,425,559	6,365,888	8,930,378
St. Louis, San Francisco & Texas	May	159	349,059	19,038	374,717	33,275	29,176	10,254	101,814	182,169	48.6	192,548	62,092	33,890	71,289
	5 mos.	159	1,580,407	143,667	1,761,527	171,542	144,456	54,960	499,770	907,504	51.5	854,023	327,754	195,726	433,224

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1944—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: 1944	1943
St. Louis Southwestern Lines	May	1,607	$5,735,394	$283,309	$6,151,340	$666,686	$602,701	$103,886	$1,462,094	$2,968,129	48.3	$3,183,211	$1,148,540	$850,138	$2,254,714
	5 mos.	1,607	25,655,953	1,512,771	27,825,962	3,146,696	2,677,527	481,422	6,766,930	13,710,196	49.3	14,115,766	5,271,176	3,890,577	5,238,724
Seaboard Air Line	May	4,174	8,220,864	3,325,749	12,249,094	1,606,138	1,742,331	239,898	3,490,323	7,570,533	61.8	4,678,561	2,378,561	1,927,067	3,450,469
	5 mos.	4,175	39,625,671	18,092,446	61,522,379	7,120,111	8,240,917	1,123,687	17,933,210	36,910,076	60.0	24,612,303	12,512,303	9,836,080	18,518,067
Southern Railway	May	6,513	15,940,074	5,067,005	22,254,433	2,576,858	3,538,860	235,964	6,187,347	13,232,256	59.5	9,022,177	3,237,252	2,881,765	3,583,801
	5 mos.	6,513	77,220,276	24,144,273	107,622,678	12,978,930	15,988,648	974,284	30,786,487	63,779,061	59.3	43,843,617	15,707,000	13,930,585	14,400,324
Alabama Great Southern	May	315	1,482,267	367,489	1,951,952	197,894	344,426	25,093	595,599	1,223,536	62.7	728,416	243,033	176,020	218,703
	5 mos.	315	6,818,663	2,028,971	9,330,499	868,270	1,393,064	104,761	2,812,905	5,481,606	58.0	3,848,893	1,167,189	885,052	1,093,508
Cincinnati, New Orleans & Texas Pacific	May	337	2,561,818	545,389	3,254,255	299,013	709,766	39,358	823,498	1,963,502	60.3	1,290,753	406,906	412,529	548,264
	5 mos.	337	12,133,759	3,105,065	16,003,488	1,545,732	3,106,954	163,167	4,054,601	9,314,322	58.2	6,689,166	1,951,332	2,137,015	2,402,386
Georgia Southern & Florida	May	397	353,332	203,317	607,061	82,365	75,347	2,519	178,810	356,489	58.7	250,572	103,628	63,198	108,171
	5 mos.	397	1,588,297	1,012,750	2,879,338	396,663	365,676	13,201	891,305	1,749,237	60.8	1,130,101	481,643	293,775	437,555
New Orleans & Northeastern	May	204	844,853	168,614	1,067,471	134,557	122,926	12,785	299,701	610,231	57.2	457,240	179,598	98,886	101,902
	5 mos.	204	4,078,220	959,915	5,284,949	667,549	566,238	54,178	1,579,625	3,051,871	57.7	2,233,078	871,512	452,517	665,346
Southern Pacific	May	8,263	31,657,029	9,045,568	44,107,988	6,044,429	7,463,640	623,018	12,531,293	28,778,636	65.2	15,329,352	4,517,261	3,160,200	4,218,635
	5 mos.	8,263	141,561,979	45,339,226	203,098,480	28,683,101	36,813,446	2,878,356	61,637,044	140,684,576	69.3	62,413,904	22,615,853	15,928,612	27,902,610
Texas & New Orleans	May	4,340	8,360,448	2,457,008	11,408,062	1,576,925	1,340,889	159,242	2,898,877	6,346,273	55.6	5,061,789	2,086,614	1,569,413	2,531,981
	5 mos.	4,341	41,207,136	11,858,081	56,027,714	7,312,464	6,613,485	764,270	14,124,873	30,705,384	54.8	25,322,330	10,025,295	7,443,809	12,184,143
Spokane, Portland & Seattle	May	944	1,914,005	219,325	2,245,098	594,070	209,391	13,970	627,090	1,506,678	67.1	738,420	584,169	414,488	605,780
	5 mos.	944	8,186,231	984,781	9,685,306	2,568,470	961,777	70,189	3,163,936	7,086,403	73.2	2,598,903	1,895,779	1,079,079	3,041,341
Tennessee Central	May	286	331,072	44,436	394,537	86,779	72,223	7,599	126,992	311,588	79.0	82,949	31,980	19,916	63,987
	5 mos.	286	1,743,519	294,333	2,142,659	446,436	330,192	36,050	671,772	1,576,528	73.6	566,131	300,837	210,453	286,072
Texas & Pacific	May	1,884	4,273,184	1,830,355	6,652,657	901,864	989,607	110,052	1,506,773	3,770,224	56.7	2,882,433	827,152	601,771	721,807
	5 mos.	1,884	21,536,285	8,845,107	33,214,633	4,395,114	4,928,614	546,223	7,688,427	18,943,932	57.0	14,270,701	3,791,550	2,853,529	3,754,804
Texas Mexican	May	162	205,481	816	235,850	10,725	18,246	4,105	54,942	97,719	41.4	138,131	108,546	92,028	—16,732
	5 mos.	162	859,788	4,791	996,648	109,672	82,467	20,943	236,093	496,973	49.9	499,675	375,753	334,380	239,424
Toledo, Peoria & Western	May	239	434,047	66	440,602	41,401	21,117	24,059	86,608	180,701	41.0	259,901	229,056	206,375	235,584
	5 mos.	239	2,223,935	455	2,243,483	197,993	107,012	117,682	445,203	925,837	41.3	1,317,646	1,156,139	1,045,162	1,000,850
Union Pacific System	May	9,782	29,089,767	7,974,154	39,992,096	5,737,169	7,344,714	592,295	10,763,202	26,242,039	65.6	13,750,057	4,309,821	3,391,666	3,920,900
	5 mos.	9,782	143,395,379	37,977,961	195,927,417	27,383,521	37,376,512	2,894,324	56,823,448	133,417,291	68.1	62,510,126	18,395,610	14,311,713	22,134,491
Utah	May	111	109,720	.....	109,762	16,297	38,390	486	33,347	93,150	84.9	16,612	7,024	7,996	12,923
	5 mos.	111	631,264	.....	631,886	78,425	202,809	2,732	188,722	494,708	78.3	137,178	72,726	57,682	76,243
Virginian	May	657	2,404,596	8,682	2,489,774	253,212	572,288	25,152	488,221	1,399,852	56.2	1,089,922	499,922	608,474	590,110
	5 mos.	657	12,307,444	39,936	12,742,493	12,250,014	2,699,906	122,087	2,628,543	6,964,515	54.7	5,777,978	2,657,978	3,070,228	3,072,228
Wabash	May	2,393	6,587,372	909,840	7,956,435	1,122,525	997,104	182,156	2,463,958	5,033,049	63.3	2,923,386	1,067,696	703,880	1,027,982
	5 mos.	2,393	32,944,430	4,461,038	39,699,586	4,954,986	4,810,184	781,630	12,133,314	23,912,629	60.2	15,786,957	5,611,559	3,834,687	4,923,448
Ann Arbor	May	294	480,683	9,134	502,232	62,328	85,984	16,909	201,525	379,484	75.6	122,748	66,583	62,845	97,655
	5 mos.	294	2,349,821	37,889	2,438,085	296,403	422,007	79,493	1,010,566	1,865,899	76.5	572,186	307,018	286,221	385,288
Western Maryland	May	840	3,027,421	29,073	3,135,837	404,808	604,838	46,310	790,075	1,939,992	61.9	1,195,845	489,845	508,874	556,784
	5 mos	840	15,178,249	153,432	15,763,078	1,793,783	2,889,799	220,979	4,195,349	9,545,165	60.6	6,217,913	3,000,913	3,130,253	3,545,542
Western Pacific	May	1,195	3,818,106	678,115	4,654,847	522,531	573,495	84,919	1,257,728	2,586,478	55.6	2,068,369	708,270	616,593	1,042,105
	5 mos.	1,195	16,965,761	3,132,868	20,827,182	2,500,068	2,810,689	412,790	6,103,617	12,539,092	60.2	8,288,090	3,152,266	2,511,884	3,793,060
Wheeling & Lake Erie	May	507	2,122,041	.....	2,215,272	242,231	401,815	40,215	657,189	1,392,154	62.8	823,118	143,577	298,004	336,810
	5 mos.	507	9,724,914	16	10,034,816	1,043,057	1,942,111	204,729	3,030,397	6,478,654	64.6	3,556,162	427,630	1,316,767	1,527,366



COMPETITIVE VIBRATION TESTS RESULT IN STANDARDIZATION ON SECURITY LOCKNUTS

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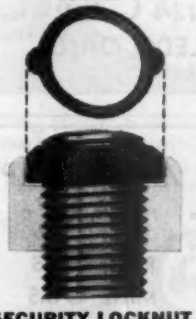

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3. Locks in any position. Doesn't require bolt tension.
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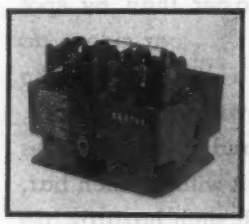

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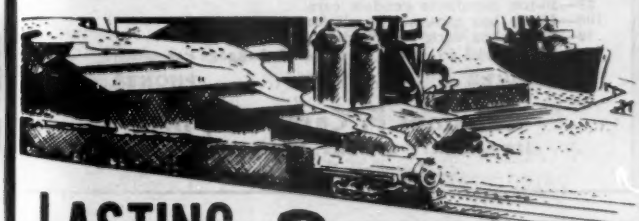

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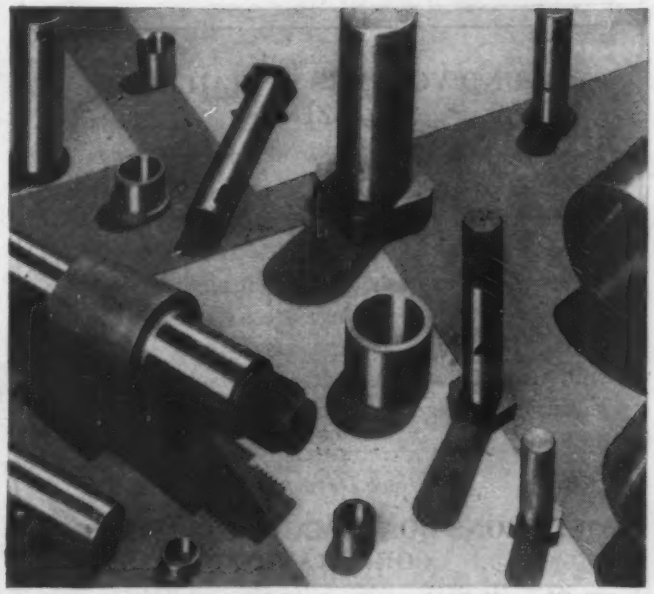

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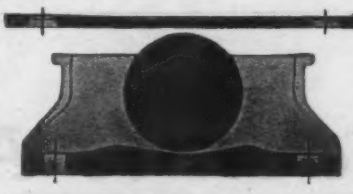

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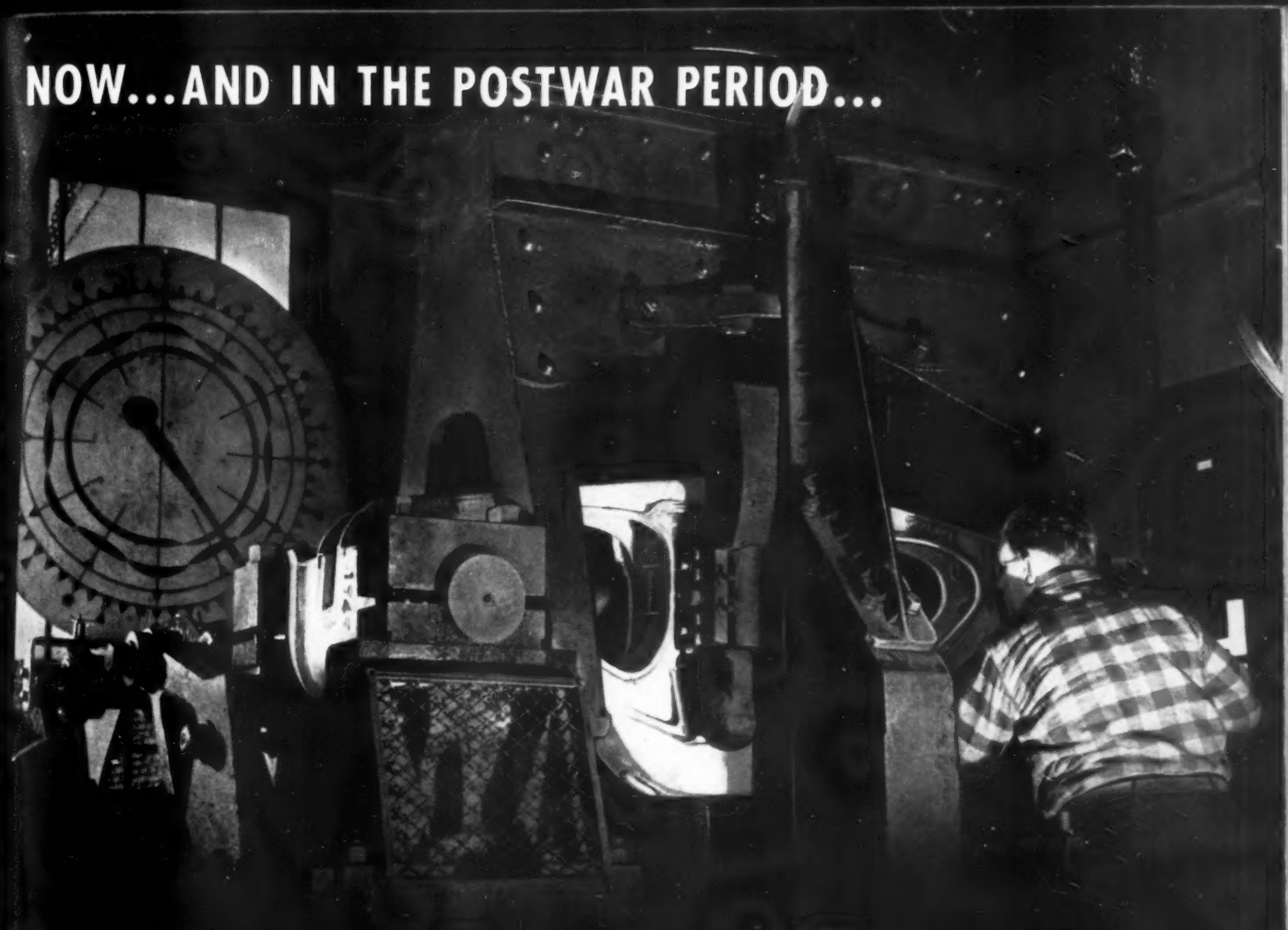

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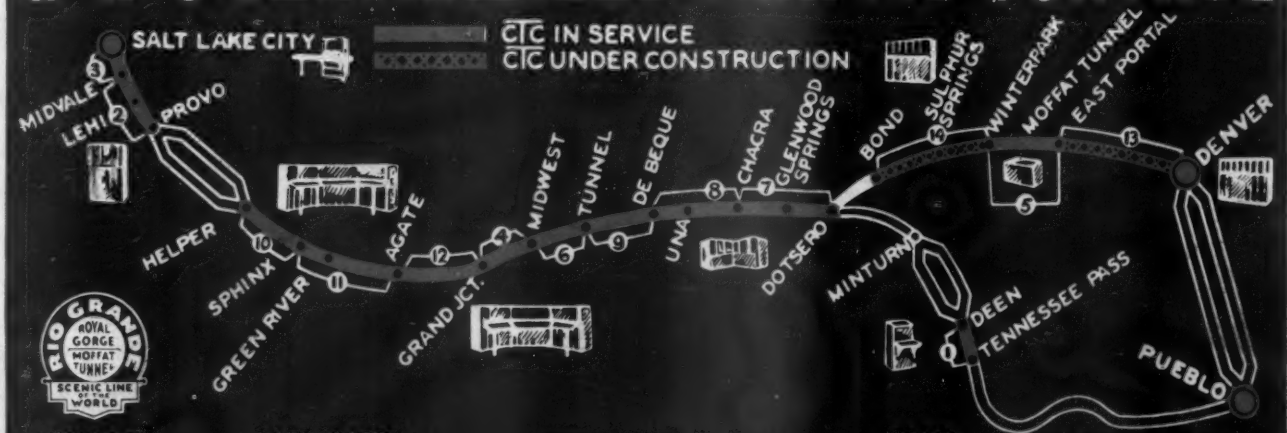

ORDER OF INSTALLATION	DATE PLACED IN SERVICE	INSTALLATION LIMITS	TRACK MILES	LOCATION OF MACHINE
1	October 1928	Deen to Tennessee Pass, Colo.	9.5	Tennessee Pass, Colo.
2	October 1929	Provo to Midvale, Utah	31.4	Lehi, Utah
3	May 1937	Midvale to Salt Lake City, Utah	16.3	Salt Lake City, Utah
4	August 1937	Grand Junction to Midwest, Colo.	13.5	Grand Junction, Colo.
5	July 1941	Moffat Tunnel, Colo.	6.5	East Portal, Colo.
6	August 1941	Midwest to Tunnel, Colo.	8.8	Grand Junction, Colo.
7	September 1941	Dotsero to Chacra, Colo.	25.2	Glenwood Springs, Colo.
8	September 1942	Chacra to DeBeque, Colo.	48.9	Glenwood Springs, Colo.
9	October 1942	Tunnel to DeBeque, Colo.	11.0	Grand Junction, Colo.
10	September 1943	Sphinx to Helper, Utah	64.0	Green River, Utah
11	January 1944	Sphinx to Agate, Utah	64.1	Green River, Utah
12	July 1944	Grand Junction, Colo. to Agate, Utah	50.5	Grand Junction, Colo.
13	Under construction	Denver to East Portal, Colo.	50.0	Denver, Colo.
14	Under construction	Winterpark to Bond, Colo.	72.0	Sulphur Springs, Colo.

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